SPECIAL REPORTS – FAA MISSION & PLANS

FLYING

THE WORLD'S MOST WIDELY READ AVIATION MAGAZINE

FEBRUARY

50¢

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CHECK PILOT REPORT – BEECH QUEEN AIR

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Air France jets were flying before Gigi was born!

Gigi is six. Yet it was *more* than six years ago (February 19, 1953, to be exact) that Air France began flying regularly scheduled pure jet aircraft!

Since then, Air France has logged over 4 million jet passenger miles. First, with the sleek, vibrationless, 500-mile-an-hour Caravelle. And now, Air France has added the fabulous new Boeing 707 Intercontinental to its fast-growing pure jet fleet. The Intercontinental is the world's fastest, largest, longest-range jetliner crossing the Atlantic non-stop between New York and Paris in only 6½ hours.

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Ernest is a strong booster for Northrop training. "It has made a tremendous difference to me, both in position and salary," he says.

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MAILBOX

TRANSITION TO TURBINES

I congratulate you on Lou Davis' two articles in the December FLYING. I particularly enjoyed Part 3 of "Transitions to Turbines" as an excellently written article which presented technical information in the most informative manner that I have seen of this kind for some long time. . . .

Would you tell Gill Robb Wilson that I found his blank verse of his "Airman's World," absolutely lovely, reflecting with true poetic awareness all the sincerity of his long experience. . . .

TED WAYNE
Manager Customer Service
Rolls-Royce Ltd.,
Canadian Office
Derby, Canada

Congratulations on your especially well-written and well-organized story on turbo-prop maintenance and servicing facilities by Lou Davis (December issue).

While we are extremely pleased with the coverage you have given PAC, we value the article even more because of the comprehensive job you have done in covering the whole field. . . .

There is one paragraph in the story which may generate some comment. This appears on page 74 and refers to Pacific Airmotive's purchase of Cochran Aviation facilities and the Beechcraft distribution. What happened was the PAC purchased the assets of Cochran and then was appointed distributor for northern California and northern Nevada by Beech. . . . I am sure distributors for Southern California, Oregon and Washington may object to the implication in this article that PAC, through its distributing company Golden Gate Aviation, has sales rights for the entire West Coast.

We feel it only fair to let you know that some of the other distributors may call this to your attention.

CHARLOTTE DE ARMOND
Public Relations Counsel
Pacific Airmotive Corp.,
Burbank, Calif.

'THE MUNITIONS LOBBY'

In my article "What About the 'Munitions Lobby'?" (November 1959) I indicated, by a generalization, that the Navy League, as well as the Air Force and Army Associations, was "nourished to a large degree by . . . members on active duty. . . ." The Navy League, unlike the other two service associations, accepts *no* members who are on active duty. Active duty naval officers nevertheless support the Navy League, attend its meetings and are prominent—as unofficial associates—in its activities.

HANSON W. BALDWIN
New York, N. Y.

THOSE LIVE WIRES

. . . On behalf of all the members of Reading Aviation Service, may I take this opportunity to express my sincere appreciation for the very excellent article on our service which appeared in the December issue of FLYING. . . .

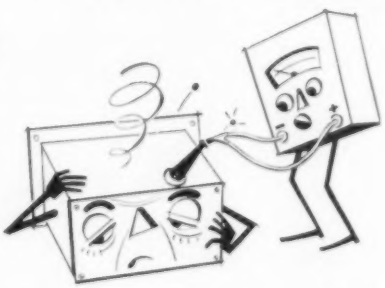
I direct your attention to the 11th Annual Maintenance and Operations Meeting coming up on June 3 and 4. We are deep in plans and preparations for this event.

ALBERT M. BERTOLET, President
Reading Aviation Service, Inc.
Reading Municipal Airport, Pa.

LICK ELECTRONIC FAILURES

On behalf of the Aircraft Electronics Association and our president, Charles Peacock, we thank you for that magnificent two-page story "Lick Electronic Failures Before They Happen" which you ran in the December issue of FLYING.

. . . Last week we started receiving requests for our lists of accredited AEA members. I had no idea where or why the requests were coming. The story, however, explained everything. You may



rest assured that all such requests will be answered.

Particularly effective was the manner in which you dressed up the article with those line drawings. Who else but FLYING could dress up a story that way?

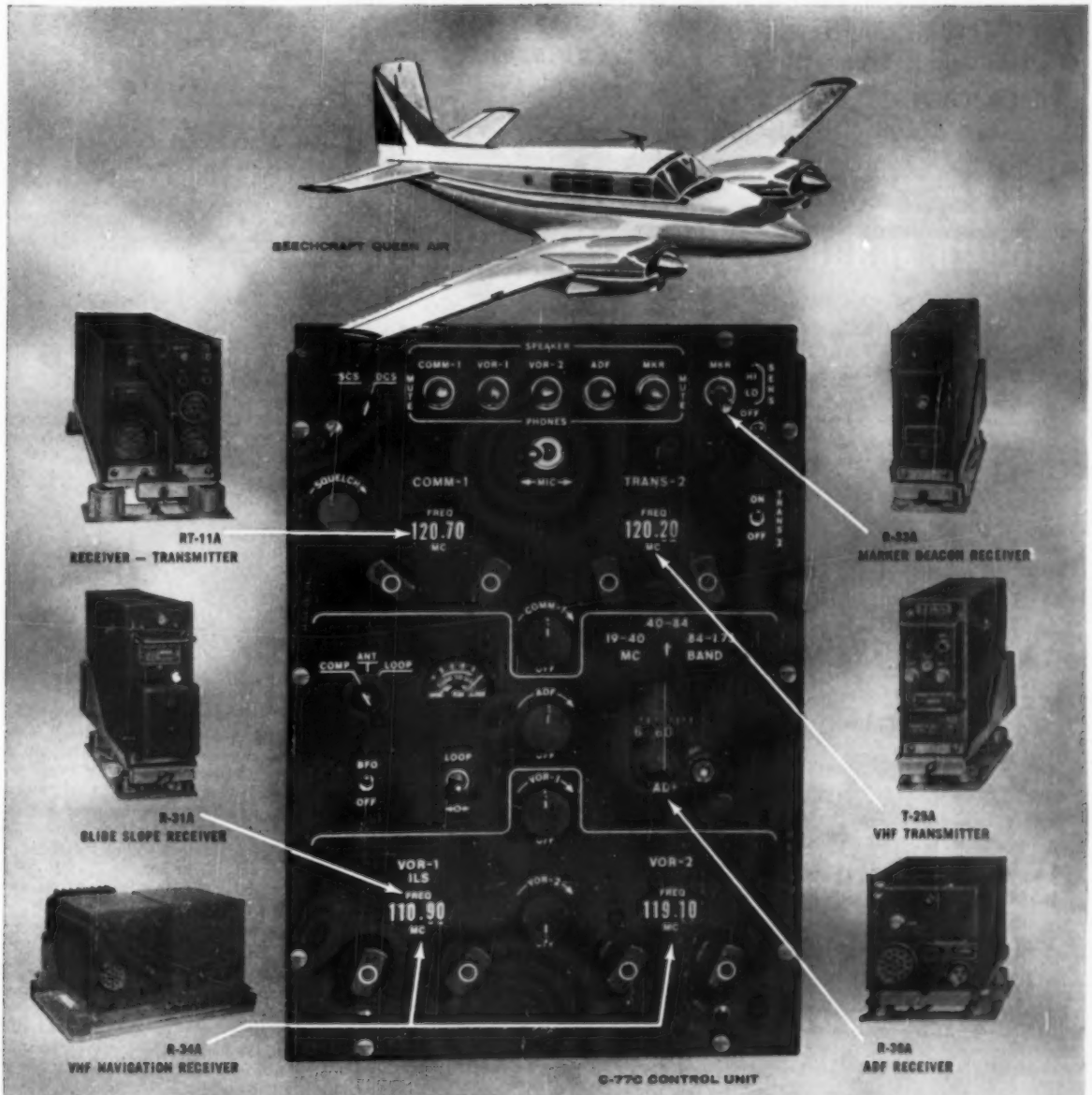
No wonder you've got a circulation of over 200,000!

MICHAEL BRAND
Michael Brand Associates
No. Hollywood, Calif.

MOONEY CHALLENGES PIPER STATEMENT

We at Mooney read with interest the article in the December issue of FLYING by Howard Piper titled, "Beware, Gullible Travelers!" We have always been of the opinion that the performance of an aircraft should be neither understated nor overstated, and therefore our advertised performance figures are as accurate as scientific methods of measurement can determine. For example, in 1955 we made a slight modification in the Mooney Mite

(Continued on page 8)



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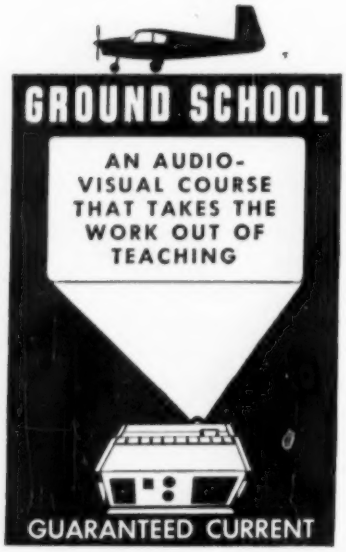

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- The Sanderson method gives you a jump on your competition. You automatically compete with the *big* schools.
- The interesting presentation increases student interest, and forms are printed so students do not have to take notes.
- Because the program is so complete, you will make safer, more qualified pilots.
- Through this course you can guarantee to qualify your students for written, private examination.

Sanderson Aviation Ground Schools
S. J. Armbrust, Gretna, Nebr.

MAILBOX

(Continued from page 6)

which reduced the cruising speed from 130 mph to 125 mph and our advertised performance reflected this reduction.

Mr. Piper, in his article, obviously was referring to Mooney in his statement "The competitor may have a model that is so similar to this product that there obviously cannot be a significant performance difference; yet the competitor advertises a 20-mph advantage." The reference is obvious because the Mooney Mark 20A uses the Lycoming 0-360 having 180 horsepower, which is the same engine used in the 180 Comanche, yet we find our cruising speed to be 20 mph faster than Piper claims for his 180 Comanche. In fact, Piper seems to be able to get a cruising speed of only one mph faster with his 250-hp Comanche than we get with our 180-hp Mark 20A.

Not being an engineer, I will not attempt to explain why our airplane is so much more efficient. In fact, it would appear that an attempt to prove or disprove a fact as important as this to the aviation-minded public would not be in keeping with the alleged Piper policy, which was supposedly "reformed" in the year 1954. Just as it is impossible to look at two athletes and determine which is the better performer, so it is with airplanes. Perhaps it could be stated that "it's all in the engineering."

Mr. Piper made one statement with which we agree wholeheartedly when he said, "To be certain about performance differences, the best way to compare airplanes is not on paper specifications but in actual side-by-side flight tests." Therefore, since our advertised speed of the 180-hp Mark 20A is so close to Piper's advertised speed of the 250-hp Comanche, we propose that Mr. Piper designate 30 days in advance a time and start-finish points for a side-by-side cross-country test of the two aircraft, taking off simultaneously from parallel runways each at gross weight. We propose that Mr. Piper be the pilot of his aircraft and that the writer be the pilot of the Mooney. If Piper accepts this challenge, it will be proof that Piper is really sincere in wanting the public to know the true facts.

NORMAN HOFFMAN, President
Mooney Sales Company
Kerrville, Tex.

THE BISHOP'S BOYS

Having recently acquired my Private Pilot certificate, it was believed that my appreciation for this privilege could not be surpassed until I read "The Bishop's Boys" by Dallas Sherman in your December issue.

Never have I read better prepared, nor more inspirational material incidental to the Wright Brothers theory of aerodynamics, their invention and construction of the first airplane, their trials and failures in accomplishing sustained flight, and their price to accomplish this feat. This is one story I sincerely believe every young American boy should read and retain within his mind.

BILL IRVINE
Sabillasville, Md.

'MAIN STREET' AIRLINES

Was extremely interested in "America's 'Main Street' Air Lines" by Lou Davis in the December issue of FLYING. I am presently associated with a group that is in the process of forming an extended scheduled Air Taxi operation throughout New England, New York, and parts of Canada, and your excellent article would be of great interest to some of the people we are contacting at this time . . . May we obtain extra copies? . . .

JOHN T. PRATT, III
Hamilton, Mass.

We very much appreciate the article "America's 'Main Street' Airlines," by Lou Davis.

We have one fairly obvious complaint, however. There was a conspicuous absence of a Piedmont F-27 turbo-prop accompanying the article!

Piedmont has just celebrated one year

of service with the F-27 and has had a remarkably happy experience with it . . .

Before closing, let me pay tribute to Gill Robb Wilson's fine blank verse poetry appearing on page 23. In this highly technical and scientific age, there is always the danger that we will overlook the sheer romance of flying. . . .

DON BRITT
Assistant to the President
Piedmont Airlines
Winston-Salem 1, N. C.

. . . I saw the excellent article you ran in December issue concerning the local service industry.

I am going to give one copy to each Chamber of Commerce for the chairman of their aviation committee and one to each of our station managers in the 62 cities we serve. Doug Billmeyer, our manager of advertising and public relations, wants to mail copies to each of the top aviation editors in our territory. Please ship immediately 185 copies . . .

TOM CROSSON
Vice President
West Coast Airlines, Inc.
Seattle 8, Wash.

GIVING 'EM AWAY

Reference November "Briefings": You say 5,691 Lockheed T-33's cost $5½ million. Wow! that's cheap . . . comes to about $965.03 each. What do they really cost?

Also reference state airport directories; Louisiana has an excellent one, as well as an aeronautical chart. Both free from Aeronautical Div., Dept. of Public Works, Baton Rouge.

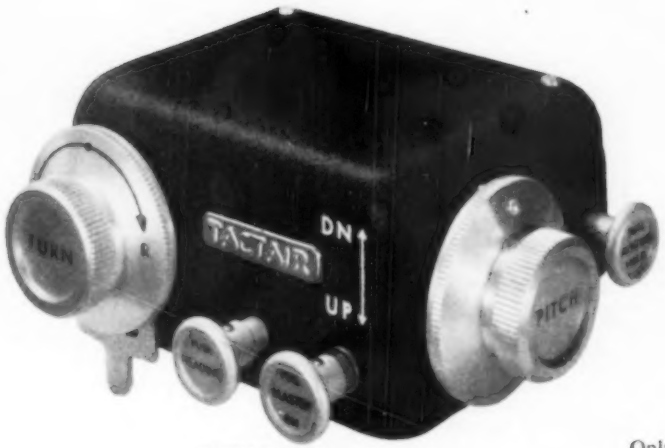
HAROLD P. RABALAIS
Baton Rouge, La.

• *Total cost of T-33's, $570,000,000.*—ED.

READY TO FLY THE MODERN WAY WITH AN AUTOPILOT?

Pick TACTAIR

BEST PERFORMING, MOST COMPLETELY SATISFACTORY AUTOMATIC FLIGHT SYSTEM FOR BUSINESS AIRPLANES



An automatic flight system in your airplane can be the most satisfactory investment you can make to increase the safety and utility of your plane, relieve you almost completely of flying chores, let you arrive refreshed and relaxed. But when you make such an investment you want to be sure you have the best. You can wisely select the Tactair T-3, three-directional automatic pilot, because *it is the best.*

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Beech Debonair
Beech Travel Air
Cessna 175/Skylark
Cessna 180/182/Skylane
Cessna 210
Cessna 310
Piper Apache
Other approvals pending

Weighs only 8 pounds.

Only Tactair gives you smooth, pneumatic operation, with no load or dependence on your electrical system. This superior feature means no clutching of the controls, no possible damage to the unit. Tactair is the only three-directional automatic flight system with Course Selector and Heading Lock *as standard.* And Tactair provides a nation-wide network of factory-approved service agencies, manned by factory-trained technicians.

The Tactair T-3 has been thoroughly proved and improved to provide you with the best, the most dependable, the most completely satisfactory automatic flight system for your business airplane. Once you've flown with the T-3, you'll agree that automatic flight is as important as radio in any well-equipped airplane.

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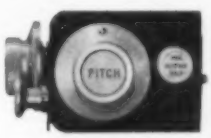
Just dial your course, before take-off if you wish, in the upper card of your Tactair Directional Gyro, engage the Heading Lock and your Tactair turns you automatically to the course you've set, holds that course unerringly. Want to change course? Just set the new course you want on the upper DG card . . . Tactair does the rest.



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Here's the ultimate in automatic flight! Automatic Altitude Hold, offered as an optional feature on the Tactair T-3. At any altitude you wish to cruise, switch on Altitude Hold. It will maintain that level precisely. Easily added to any T-3 installation.

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Briefings . . .

BELIEVED TO BE the nation's first flight engineer to retire at age 65, George Casey (right) of Northwest Orient Airlines was feted at a retirement party and presented with a gold watch and monkey doll by Northwest pilots and fellow flight

engineers. Captain Walter Bullock, who marked his 43rd year as an aviator, (left) did the honors. With Northwest since 1927, Bullock learned to fly in 1916; now has more than 35,000 hours in the air.

MID-NOVEMBER DELIVERY of a Piper twin-engine Apache to Firewood Manufacturing Co., Dearborn, Mich., marked a milestone for Piper Aircraft which no other aircraft manufacturer has yet reached. It was the company's 50,000th production aircraft. Piper is currently turning out 13 business and utility aircraft daily, it is reported.

MOTOROLA, INC. has acquired LearCal, the non-military products division of Lear, Inc., to operate henceforth as a subsidiary under the name of "Motorola Aviation Electronics, Inc.," with production continuing at Santa Monica, Calif., for the time being. Motorola reports to FLYING that "acquisition will not affect existing LearCal distributor organization; (and) instrument users will continue to receive sales and maintenance service from the many distributors located at airports throughout the country." LearCal non-military products consist of airborne communications and navigation equipment and light aircraft autopilot for executive and personal aircraft.

CONTINENTAL OIL CO. has taken delivery of a Grumman Gulfstream to be used for corporate personnel travel. Equipped with complete communications and navigation equipment—radio, radar, autopilot and related system—this nine-passenger configuration includes six executive type chairs. Garrett Corp's AiResearch Division executed the conversion.

REVISION of the existing eye standards and eye-testing procedures for civil airmen is under study by the Office of the Civil Air Surgeon, based on recent recommendations made to FAA by a consultant group of ophthalmologists. There has been no comprehensive review of these standards, it is said, since 1926.

OUTRACING the speed of sound two and one third times, Maj. Joseph H. Rogers, USAF (left) flew this Convair F-106 Delta Dart to a new unofficial world's speed record of 1,520.9 mph over the desert near Edwards AFB, Calif., on Dec. 16. Topping previous USAF record of 1404.09 mph, achieved May 16, 1958, Rogers also beat USSR claim of 1,483 mph, Oct. 31, 1959, in a delta wing fighter.

THIS WATCH is the GMT-Master, style 6542 used mainly by navigators and pilots. Its makers, the American Rolex Watch Corp., 580 Fifth Ave., New York 22, N. Y., is recalling it for radiation testing by the Atomic Energy Commission. A special-purpose wrist chronometer, it

is the *only* Rolex model which should be returned to the company. According to Rolex, if yours is not a GMT-Master, as shown in this picture, you may be assured that it does not contain any substances in violation of AEC regulations.

SIERRACIN CORP., producers of Sierracote heated windshields to prevent fogging and icing problems in aircraft, has been granted FAA approval for its windshield installations on Douglas DC-3s and Lockheed Models 18 and PV-1 aircraft. The Burbank, Calif., manufacturer also announces it now has under development Sierracote panels and windshields for other executive and private aircraft models.

FOR THE FOURTH consecutive year members of the National Air Taxi Conference achieved a fatality and injury free record in air operations, according to outgoing president, W. Clayton Lemon; and this record, with a considerable increase in operations over the previous year, 1957. Meeting in New Orleans was highlighted in another respect, by the signing of an agreement between NATC and the Tele-Trip Co., Inc., which will make trip insurance available to passengers riding NATC aircraft at a rate comparable to that of scheduled airlines. Elected president for 1960 was Julius Goldman, Revere Airways, Inc., Revere, Mass.

A COMPLETELY automatic oxygen system kit which may be easily installed as a permanent fixture in any size or type of aircraft to provide high altitude safety in unpressurized aircraft, has been announced by the A.I.R. Corporation, Oakland Municipal Airport, Calif. Weighing 4½ pounds, less cylinder, the kit consists of regulator, a flush-mounted console, fittings, cylinder and brackets with two, four or six plug-in valve outlets. Systems with additional outlets—up to 15—are also available. Prices begin at $187.50.

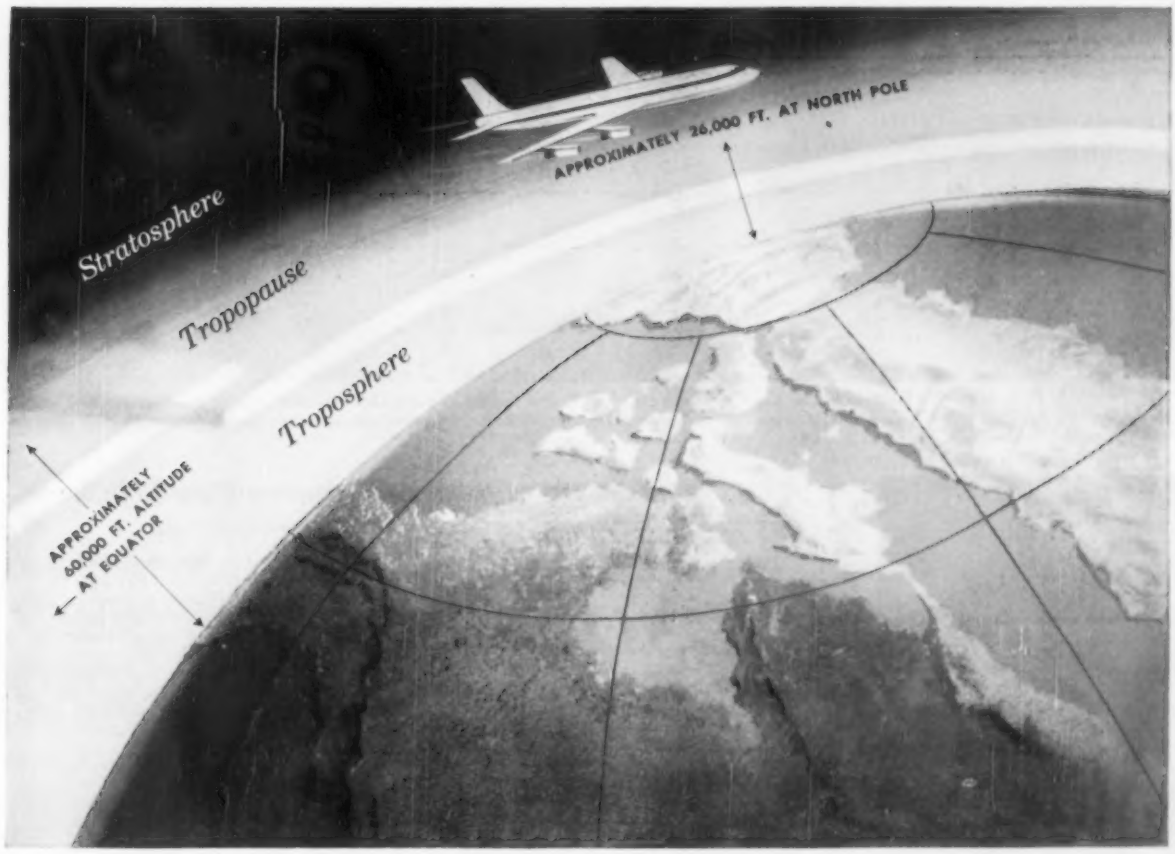
INCREASING ACCEPTANCE of modern radio equipment and navigation aids by general utility aircraft has more than doubled the number in this category now carrying VOR receivers; and pushed the number of planes equipped with two-way radio past the 50 per cent mark for the first time. Latest FAA study shows 42.5 per

(Continued on page 14)

Mobil — FLY WEATHER-WISE

POLAR FLIGHTS

Low Arctic Stratosphere on Polar Flights . . . Provides Warmer High Altitude Temperatures than in Tropics!



THANKS to a lower troposphere and resulting lower stratosphere, temperatures above approximately 25,000 feet in the polar regions are actually milder than they are at a comparable height in tropical regions . . . and they rarely vary much from between minus 40 to minus 60 degrees Centigrade at jet altitudes. For jet aircraft following the polar route, this means that they have virtually a stable atmosphere for the largest part of their journey.

Knowledge of polar weather conditions at high altitudes makes possible these extreme long-range flights on regular schedule. These flights call for the most exacting flight planning. And, of course, invaluable aids to the exacting flight planning are highest quality fuels and lubricants.

Rely on the finest . . . Mobiljet 158—an ideal long-range fuel—already proved for high performance airline operations. Mobiljet 140—a performance proved airline jet fuel with −40 F Freeze Point.

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On forbidden ice packs off Siberia, long trail ends for Tom Bolack and largest bear ever recorded. Hunting many days with chartered light aircraft, Bolack finally tracked bear 100 miles in 50-below cold, landed, shot him as he charged at 50 yards.

World-record polar bear is 30th bear Bolack has killed. Burns Maus (L), Champion Spark Plug Co. Aviation Sales Mgr., questions Bolack about hazardous Siberian flight.

A behind-scenes report on aviation booster Tom Bolack and his most unusual interest in aircraft engines

No Margin For Error

by HERB FISHER, *international aviation authority, veteran test pilot, author*

Sportsmen the world over were awed recently when big game hunter Tom Bolack slipped into the forbidden ice wastes off Siberia in a chartered light plane and tracked down the largest bear known to man.

Appraising the 13-foot monster at Bolack's Farmington, New Mexico, ranch, I asked: "Tom . . . how do you do it?"

"Simple, Herb," he laughed. "First you have to strike oil—then you just go out and do these things . . ."

Indeed, a dozen years ago the only "wealth" Bolack had was the geology knowledge in his head. He was practically penniless. Today he's a multi-millionaire businessman and statesman —a respected force in oil, gas, uranium, federal land reclamation, experimental

One of several P-51 Allison aircraft engines (mobile unit) simultaneously pumping sand/oil into well to jar oil loose. Engines run full-throttle—if plug misfires, well could be lost!

Bolack dropped this 6-ton bull at 75 yds. By plane, jeep and truck—Champion-equipped and with Bolack himself looking after engines —Bolack traversed 3,500 miles, hunting Sahara to Congo, bagging hippo, lion, oryx, giraffe, cape buffalo, eland and addax.

(Advertisement)

Herb Fisher

agriculture, politics, government, philanthropy, big game hunting, aviation promotion. Bolack's rags-to-riches rise wasn't as "simple" as he makes it sound, however. Those who know him best will tell you it came about from early years of sweat and blood—hardship—followed by shrewd business investments and dedicated leadership in projects benefiting the Southwest.

It was Bolack's interest in general aviation—and a fascinating story I heard about a *most* unusual interest in aircraft engines—that took me to see him. In business, he uses airplanes like most people use telephones, having become an airline "million-miler" in very few years.

On hunting expeditions — Africa to the Arctic — he charters light aircraft and surprises pilots with his know-how on flight conditions and engine performance. As an aviation booster, he was instrumental in getting better airport facilities and service at Farmington. But it's in the oil fields that he utilizes Allison aircraft engines in a way that'd make a P-51 think it's an X-15 . . .

"Tom, what about those aircraft engines in the oil fields—and the tie-in to that highly dangerous hunter-plane mission off Siberia? I don't know what oil fields have to do with aircraft engines, but I do know that your 'bush pilot' guides, Leon Shellabarger and Johnny Swiss, tell me you got that world-record bear under the most adverse flight conditions imaginable . . . And they tell me something else—the main reason I'm here—that you've got a 'bug' for poking into a plane's engine to see what's in it before flying off into the wilds . . ."

"Herb," said Bolack, "when you work up in the oil fields, you get to know engines inside and out—all kinds, especially aircraft—and you get mighty critical of them. You see, to knock oil loose from good geological formations that just aren't 'giving,' we take a bunch of mobile Allison aircraft engines and pump sand and oil into the nonproductive wells—maybe 50 tons of sand—at 100 barrels a minute! We run these Allisons for a couple of hours at *full throttle*, maximum torque—like running a plane at take-off for two hours.

"That's where you learn to 'tell the men from the boys' in the way of equipment. Here's a classic example: Because this well-fracing process requires continuous, uniform, maximum pumping pressure, *one little ol' misfiring spark plug could cause us to lose a million-dollar oil well!* That's why those Allison aircraft engines have Champions in them—it's attention to 'details' like that which often makes the *big* difference. And that's why, Herb, when I charter a plane for 75-below Arctic hunting or 130-above jungle or desert flying, I often check to see if *it's* got Champions. In the oil fields, a plug could be worth a million dollars. In the air, it could be priceless."

I was frankly amazed—as well as intrigued—by Bolack's statement that a single plug could cost him a million-dollar well, and we went out to look over a nearby well-fracing project. Later, back in his museum-like trophy room, laden with scores of animals from many hunts in many parts of the world, I told Bolack I knew darn well he hadn't gone "spark plug inspecting" on the many days he and Shellabarger looked for that world-record bear—"because Shellabarger's an old pro at this Arctic 'bush flying,' and he told me he'd made it clear to you long ago that he flies on nothing *but* Champions under those operating conditions."

"That's right, Herb," Bolack said. "And let me tell you about those operating conditions: I'd been after that big bear for quite some time. I'd become convinced that the real giants ranged far out to sea on the ice, and that I'd have to go 'way out where you just don't go. Shellabarger, Swiss and I decided anyway to hunt as far out as our two light planes could range—carrying extra gas—despite the possibility of blizzards or 'white-outs' cutting off our return 200 miles offshore. Let me tell you, the Arctic is death itself. Gale winds drive fine snow into your engines, and moisture as well as extreme cold is an ignition problem. Ask Shellabarger—in '55, engine trouble forced him down 100 miles offshore, and he spent 36 hours on floating ice during a blizzard. You've *got* to have dependable equipment and plugs. Anyway, some mornings we'd take off when you couldn't see a windsock at 50 feet. We'd apply fire pots to unfreeze the engines—it was 50 below. And, I might add, we had instant 'cold-starting'—how do you like that for plug dependability?"

The flying hunters defied Soviets as well as blizzards the day Bolack finally sighted the monstrous bear tracks. Not worried about their engines but plenty worried about their dwindling gas supply, they tracked the great bear for 100 miles, over the Bering Sea to the Siberian coast. There they chanced a landing on treacherous ice—with just barely enough gas in their five-gallon auxiliary cans to get them back to Alaska—and Bolack shot the brute as he charged the frantic men at 50 yards.

"Not one misfire—*fortunately*—gun *or* plugs!" Bolack said. "But, Herb, I think this will be my last Arctic hunt, for two reasons: Arctic air hunting is the most dangerous sport in the world—and I'll never find a bigger bear!"

SUCCESS FORMULA FOR BAGGING A WORLD-RECORD BEAR

Tom Bolack, poor Kansas farm boy. Oil field "roughneck" at 16, driller at 19, supt. at 21; two years, Kan. Oil Commission. Lived, breathed geology – self-taught. Wandered New Mexico broke, hungry; ridiculed for oil search. In 1946, age 27, borrowed $600, acquired "choice wasteland," 25¢ acre. Months of toil . . . finally, three of the best wells ever drilled in that now highly productive area – one with 8,000-barrel-a-day indicated capacity! Tom counted first of several millions in 1950; nationally honored as "Oil Man of the Year."

In 10 years, shrewd investments and civic work catapulted him to one of state's wealthiest, most prominent leaders: Elected to State Legislature. Mayor of Farmington ('52-'54). Organized Aqualante bloc, set up offices in Washington, D.C., at own expense, for two years led four-state citizens movement that pushed through Congress West's greatest land reclamation project – Upper Colorado River Water Bill. Cited by President, Congressmen, Navajo Nation. State's "Outstanding Citizen Award," '58. Appointed by Pres. Eisenhower to U.S. Assay Commission. Advisor, U.S. Small Business Administration.

President 3 years and now chairman of Executive Committee of Petro-Atlas Corp., Floyd Odlum's Atlas Corp. subsidiary, and director of Atlas' uranium company. Also, a national director of Boy Scouts of America, Independent Petroleum Assn. of America, Uranium Ore Producers Assn., Uranium Institute of America, N. M. Oil & Gas Assn., Independent Petroleum Producers Royalty Owners Assn., N. M. Land Resources Commission. Headed hospital, airport building campaigns. Established state's only privately operated experimental farm – greenhouses, vast irrigated lands, "super-vegetables."

Because of necessity for dependable oil-field machinery, Bolack's many trucks, tractors, jeeps, roto-tillers on his nationally acclaimed experimental farm are also Champion-equipped.

CHAMPION SPARK PLUG COMPANY • TOLEDO 1, OHIO

Briefings . . .

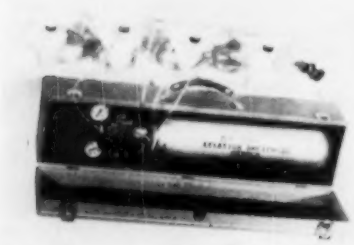
(Continued from page 10)

cent of all general aviation planes equipped with VOR navigation facilities, as compared with 20.8 in 1954; and 60.8 per cent with two-way radio as compared with 47.8 five years ago. This information is taken from FAA's booklet "General Aviation Aircraft Radio Equipment, 1958," available for 20 cents from Government Printing Office, Washington, D. C.

FOR HIS ALMOST MIRACULOUS "save" of a single-engine private airplane, lost about a year ago on a dark night over Chesapeake Bay, the Air Traffic Control Association selected James R. Parkinson (right) of Annapolis, Md., a tower op-

erator at Baltimore International Friendship Airport, for the honors of "Controller of the Year." At Awards banquet in Oklahoma City Parkinson was congratulated by another honored guest, Arthur Godfrey—who was cited by the Association for his advocacy of the controller's profession over TV and radio. Chicago's Midway Tower was named "Facility of the Year."

FOUR-OUTLET, lightweight oxygen system, said by the manufacturer to be smallest and most compact on the market, and one which measures up to all FAA oxygen flow requirements, is offered by Zep Aero, 115 Sheldon St., El Segundo, Calif. Device features a two-stage reg-



ulator requiring only one setting (for appropriate altitude) and remains constant for duration of the cylinder. Available with or without carrying case, the unit also includes a filler adapter for refills anywhere. All size cylinders are interchangeable with the unit.

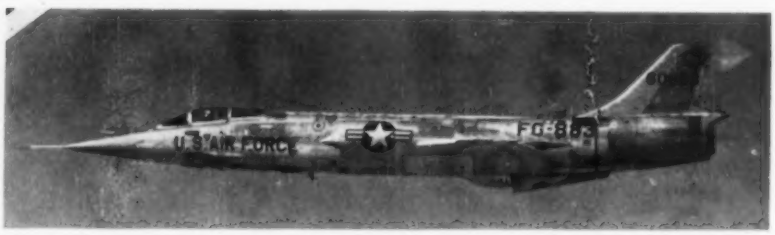
CALLAIR, INC., manufacturers of the A-5 and A-6 agricultural airplane in Afton, Wyo., has announced the purchase of controlling interest in the company by John Mangum, Jr., of Bay City, Tex. Mr. Mangum has been a company dealer for the past three years.

ILLINOIS DEPT. of Aeronautics starts the year off with renewal of its ground school safety courses for resident pilots. The first two-day safety course is scheduled for Jan. 29-30 at Illinois State Normal University at Normal, Ill. A safety refresher course for central Illinois pilots follows on Feb. 3 in the Science Bldg., Lecture Hall at Millikin University in Decatur. Others will be scheduled regularly throughout the year.

PYROTECTOR, INC., Hingham, Mass., has named Van Dusen Aircraft Supplies, Teterboro, N. J., exclusive national distributors for its smoke and fire detection equipment. Principal product to be marketed through Van Dusen is an aircraft smoke and fire detector for installation in baggage compartments and other unsupervised or unoccupied sections of aircraft.

MEETING IN FINAL session at the 34th annual Aviation Distributors and Manufacturers Assoc. conclave in Hollywood, Fla., Paul A. Kennedy of Southwest Airmotive, Dallas, Tex. (center), incumbent vice president of ADMA, was elected to the presidency. New vice presidents elected were E. H. Fitch, B. F.

Goodrich Aviation Products, Akron, Ohio, (left) and George R. Galipeau, Van Dusen Aircraft Supplies, Teterboro, N. J. Directors elected included Paul G. Bingaman, St. Louis, Mo., G. J. Bishop, Westerville, Ohio., E. M. Humphrey, Akron, H. K. Wright, Mineola, N. Y., J. G. Robinson, Denver, and George E. Wilson, Chicago.



USAF Capt. Joe B. Gordon, aiming for a new world's altitude record, climbed this Lockheed 104C Starfighter to an altitude of 103,395.5 feet out over Edwards AFB, Dec. 16 last. Tracked by NAA officials, Gordon's altitude exceeded that reached by a Navy McDonnell F4H on Dec. 6th, 1959, by 4,835.5 feet. The previous official record was 94,658 feet, achieved in July 1959 by a Soviet TU431.

SWITZER BROTHERS, manufacturers of fluorescent paints under the trade name of Day-Glo, report a new Day-Glo paint remover which is said to simplify the repainting job. Two technical bulletins on fluorescent paint removal and repainting are offered by the company at 4732 St. Clair Ave., Cleveland 3, Ohio.

THE NATION'S AIRPORTS have been apportioned some $57 millions in Federal funds for the coming fiscal year. The funds, distributed among the 50 states plus Puerto Rico and the Virgin Islands involve a total of 288 airports and, as advocated by the authorities, have generally been assigned to projects dealing primarily with the safety of airport operations —about 75 per cent for improvements and installation of runways, taxiway, etc., and another 17 per cent for land purchases. The remainder is held in discretionary funds to be allocated later.

COMPLETION of a $500,000 expansion and building program for Jeppesen & Co. of Denver, Colo., has placed its executive offices, along with its production department, under one roof in a new 45,000 sq. ft. building at 8025 E. 40th Ave. (just off the North boundary of Stapleton Airfield). Production areas are arranged for a smooth flow from map and chart makers' drawing boards through final processing to warehousing rooms and shipping platforms.

PILOTS CHARGED with the responsibility for keeping abreast of the myriad rules and regulations governing flight, in particular the professional pilot, may well be interested in a comprehensive "dictionary" of up-to-date reference materials, under the title "Airman's Integrated Dispatch Essentials." Compiled by Melvin N. Peterson, assistant flight dispatcher for

(Continued on page 114)

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Convair 440—NTSO engines and props. Engine analyzer. Sperry A12 autopilot. 5200 total hours since new. Available for immediate inspection. Airline or executive interior.

E50 Twin Bonanza—350 hours total, Hartzell props, A.R.C. ADF, dual omni, Course Director, Sapphire VHF, etc. Traded on Super 92 DC3. Sale or lease. Special Wholesale price, **$59,500.** See at Pompano.

D18S—New interior, painted, hydromatics, dual A.R.C. omni, ILS, LVTR36 VHF, ADF, boots, anti-icing, etc. New ship guarantee, **$29,500.** See at Pompano.

D18S—Excellent interior, painted exterior, dual instruments, eyebrows, hydromatics, deicers, oleo drag legs, omni, VHF, ADF, ILS, LF, dual omni, etc. Special **$23,500.** See at St. Louis.

Convair 340 & Martin 4-0-4—Available. Also engineering for autopilot, radar, radome.

Super Hiller Helicopter—UH-12B, low time, with new 200HP engine, new upholstery, new paint, transportation trailer. **$22,500.** See at Pompano.

DC3—24 seat airliner, Collins 51R omni, ILS, ADF, ARC-1 50 ch VHF, LF, Sapphire 360 ch VHF, etc. **$39,500.** With 17 seat executive interior, dual Collins 51R omni, ILS, ADF, Sapphire 360 ch VHF, ARC-1 50 ch, etc. **$59,500.** See at St. Louis or Pompano.

Two Convair 240s—NTSO engines and props. Engine analyzer. Excellent condition. World's best price. Available for immediate inspection. See at Pompano and St. Louis. Airline or executive interior.

Aero Commander 680—Late model, like new. 7 place, full executive Collins and A.R.C. radio. Traded on Super-92 DC3. Special wholesale price, **$59,500.** Sale or lease. See at Pompano.

Custom 18 Twin Beeches—Two now in work. 1951, NTSO low time air-frames, engines, hydromatics, Collins omni, A.R.C. omni. A.R.C. 210 VHF, airstair, deluxe Custom 18 interiors with picture windows, new ship guarantee, **$49,500.** See at Toledo and Trenton.

Grumman Goose—Amphibian. Hartzell props, deluxe executive interior, metal wings. See at Pompano.

Super-92 DC3—Deluxe executive interior, lightweight landing gear doors, Collins and Bendix radio. Freshly reconstructed, new ship guarantee. Sale or lease.

C47A—Dual Collins 51R omni, ILS, A.R.C. 210 VHF, standby VHF, HF, ADF, etc. All new control surfaces, cargo door, raised floor, insulated cabin, 4 folding chairs. New ship guarantee. **$79,800.** See at Pompano.

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HAVE YOU READ?

BY JAMES F. SUNDERMAN

THE WORLD'S FIGHTING PLANES, by William Green and Gerald Pollinger (Hanover House, $3.50).

Now in third, revised edition, this handy reference to military aircraft features active combat planes of all nations —those in service regardless of age, and those in production or going into production. They include fighters, bombers, recons, trainers, transports, and helicopters.

Photo-wise, 262 aircraft and 188 three-view silhouettes appear along with narrative vignettes detailing in brief, production, test and combat history, numbers manufactured. Design, engineering and operational specifications give complete coverage to each.

AIRPORTS FOR JETS, by Maj. John E. Peterson, USAF (American Society of Planning Officials, 1313 E. 60th St., Chicago 37, Ill., $2.50).

City and government officials can no longer afford to look at the jet age with blinders on their eyes. Peterson here provides an interesting, thorough study of a timely and critically important subject—jet airports.

Topics discussed include new air travel trends, air corridors and airspace above airports, jet operational characteristics related to site locations, noise, airport and community protection measures, relationship of jet airports to nearby communities and the functional peculiarities of jet airport design and location.

This small, paperback booklet is for the planner, the manager, the airport operator, airline official and all who share the responsibility for public communication and transportation.

A HISTORY OF AIR RESCUE SERVICE, edited by John L. Vandergrift Jr. (Air Rescue Service, Orlando, Fla.).

An official, highly illustrated story of the unique USAF service which, through the years, has guarded the airways of the world, assisting in air emergencies and aiding in aerial disasters wherever and whenever they occurred. It describes a brilliant record covering WWII, Korea and the intervals of peace, in terms of the men, the mission, the equipment, the bases, and the accomplishments, worldwide.

SHOULDER THE SKY, by George Leonard (McDowell, Obolensky, $4.50).

Here is an entertaining, introspective air novel about young Air Force flying instructors at a southern air training base and their monotonous duty during the hectic years of WWII. Portions depict the

(Continued on page 20)

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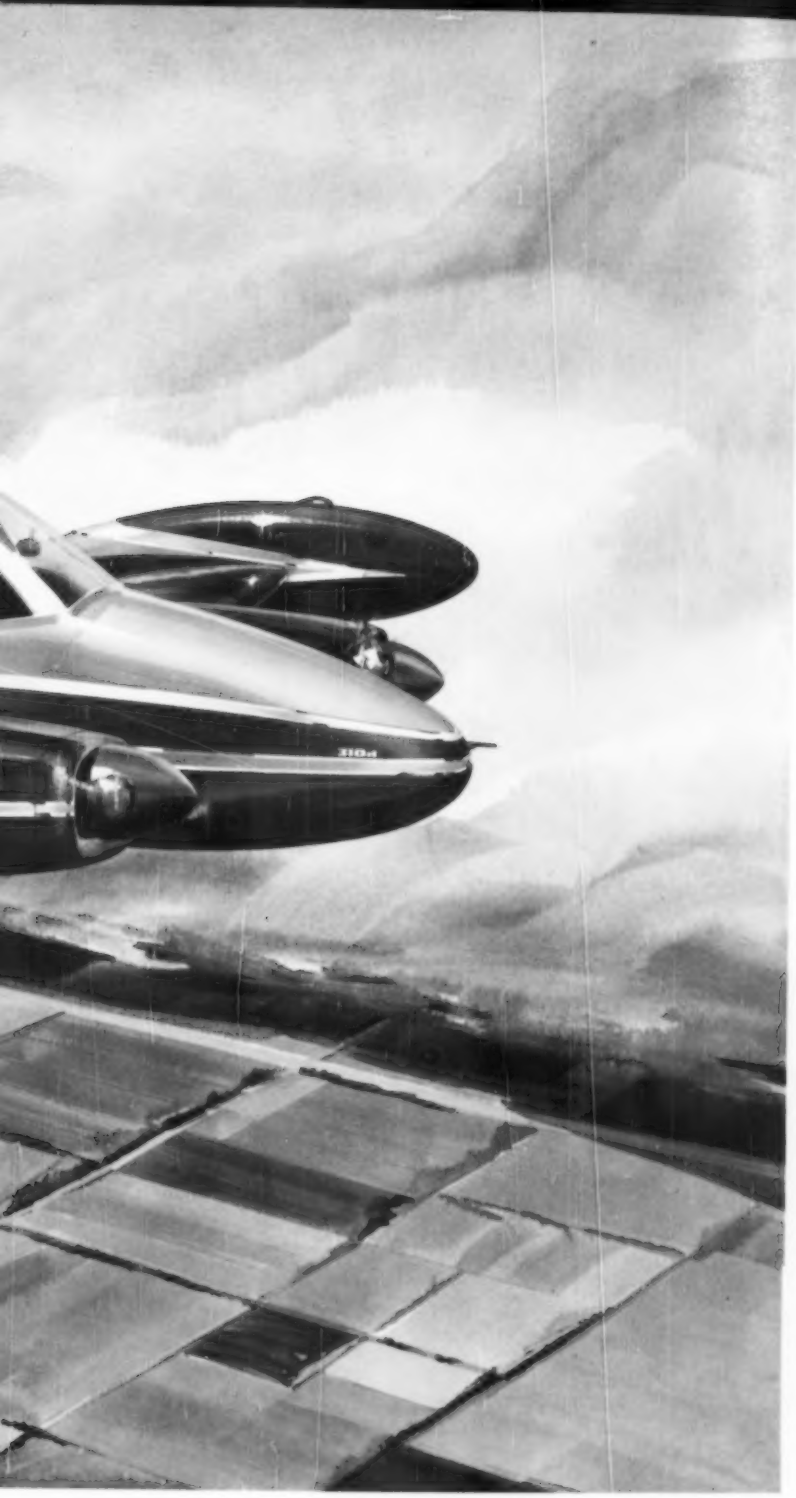

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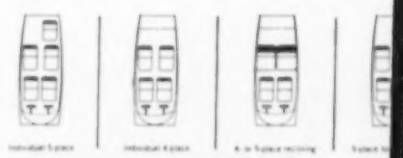
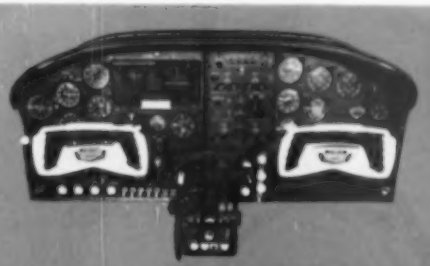
STATE ROOM SPACIOUSNESS You can relax while you leave your competitors behind in a great new flight/sweep Cessna 310d for Sixty. Miles swiftly fly by the big glare-proof picture 310d . . . you're scarcely aware of the passage of time . . . for the 310d is styled like a spacious stateroo seating . . . handcrafted elegance . . . soft toned color harmony and incomparable convenience . . . eve business travel a profitable pleasure! You'll find, too, that the 310d is faster than most commercial sch you to avoid crowds . . . to go whenever, wherever you please.

FIVE VERSATILE SEATING ARRANGEMENTS The standard, 5-place version offers passenger rear seat with adjustable back (five settings). The 5-place lounge interior has an individual rea with a generously proportioned, 2-place lounge. 4- or 5-place reclining combination includes two, extra reclining rear seats with adjustable seat backs and "tilting-action" cushions for proper leg support. Indiv two individual rear chairs of the same design as front seats. Center aisle styling permits freedom of a area. Individual 5-place again features center aisle with 5 individual tilting seats. Front seats are the sam New, built-in arm rests and head rests for individual seats are optional.

QUIET ZONE Full quarter-inch thick windshield and double plate rear windows with silencer spacing of dead air in between keeps cabin area at whisper-quiet sound level. Extra thick cabin sound control materials soak up air, engine, and vibration noises.





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OM SPACIOUSNESS You can relax while you leave your competitors behind when you travel v flight/sweep Cessna 310d for Sixty. Miles swiftly fly by the big glare-proof picture windows of the e scarcely aware of the passage of time . . . for the 310d is styled like a spacious stateroom . . . luxurious dcrafted elegance . . . soft toned color harmony and incomparable convenience . . . everything to make a profitable pleasure! You'll find, too, that the 310d is faster than most commercial schedules . . . allows rowds . . . to go whenever, wherever you please.

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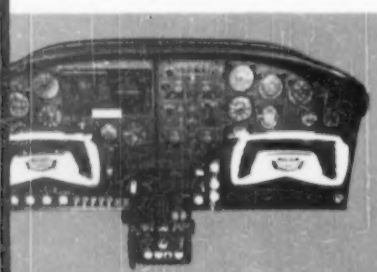

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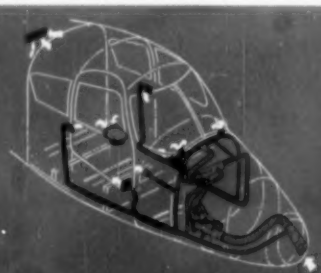

The 310d's "Comfort-Conditioner System" heats, ventilates, and defrosts giving wide range of comfort control at all altitudes, during all-weather conditions. "Spark-ignition" 35,000 BTU cabin heater distributes air evenly, quietly — without drafts — throughout entire cabin area. Attractive air outlets have controllable shutters to govern air flow into each cabin section. Cabin exhaust vent removes stale air, cigarette smoke, for extra flight comfort.

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JADE

The look . . . the feel . . . the quiet good taste of quality surrounds the three exciting new 310d flight/sweep interior choices for 1960. Magnificently styled in soft-tones of bronze, flamingo, or jade . . . each interior is brilliantly complimented by the finest of materials . . . rich seating fabrics . . . thick luxury loom wool carpeting . . . soft leathers and imaginative trims. Top convenience is added to luxury styling, too, with a cigar lighter, ash receivers, optional drop-leaf walnut writing desk, magazine racks, and a utility shelf for casual in-flight baggage items. Added comfort is provided by console and dome lights which give soft, clear illumination in just the right intensity and by the best in heating and ventilation engineering and design.

Created by skilled stylists and handcrafted by seasoned specialists . . . the 310d is made *to make you comfortable — as you leave your competitors behind!*

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PERFORMANCE AND SPECIFICATIONS

GROSS WEIGHT	4630 lbs.	4600 lbs.	4300 lbs.
SPEED: BEST POWER MIXTURE			
Maximum at Sea Level	242 mph	243 mph	245 mph
Maximum Recommended Cruise, 70% Power at 8000 feet	230 mph	232 mph	225 mph
RANGE: NORMAL LEAN MIXTURE			
Maximum Recommended Cruise, 70% Power at 8000 feet	825 miles	840 miles	855 miles
100 Gallons, No Reserve	3.8 hours	3.8 hours	3.8 hours
	216 mph	221 mph	224 mph
Maximum Recommended Cruise, 70% Power at 8000 feet	1 370 miles	1085 miles	1100 miles
130 Gallons, No Reserve	4.9 hours	4.9 hours	4.9 hours
	216 mph	221 mph	224 mph
Maximum Range at 10,000 feet	1 440 miles	1480 miles	1505 miles
130 Gallons, No Reserve	8.4 hours	8.7 hours	8.9 hours
	171 mph	170 mph	169 mph
RATE OF CLIMB AT SEA LEVEL:			
Twin Engine	1 000 fpm	2000 fpm	2200 fpm
Single Engine	460 fpm	525 fpm	615 fpm
SERVICE CEILING:			
Twin Engine	21,400 ft.	22,500 ft.	23,500 ft.
Single Engine	7,700 ft.	9,200 ft.	10,900 ft.
TAKE OFF:			
Ground Run	800 ft.	660 ft.	560 ft.
Total Distance Over 50-foot Obstacle	1395 ft.	1250 ft.	1130 ft.
LANDING:			
Landing Roll	* 620 ft.	610 ft.	575 ft.
Total Distance Over 50-foot Obstacle	*1720 ft.	1680 ft.	1585 ft.
EMPTY WEIGHT	3037 lbs.	3037 lbs.	3037 lbs.
BAGGAGE	200 lbs.	200 lbs.	200 lbs.
WING LOADING: Pounds per square foot	27.6 lbs.	25.7 lbs.	24.0 lbs.
POWER LOADING: Pounds/HP	9.3 lbs.	8.6 lbs.	8.1 lbs.
FUEL CAPACITY: Total	102 gals.	102 gals.	102 gals.
Standard	133 gals.	133 gals.	133 gals.
Optional			
OIL CAPACITY: Total	6 gals.	6 gals.	6 gals.
POWER: Two Continental 6-Cylinder, Fuel Injection IO-470-D Engines, 260 Rated HP at 2625 RPM.			
PROPELLER: Constant Speed, Full-Feathering Hartzell — HC-B2S1-2/9433-4			
WING SPAN	35 ft.	36 ft.	35 ft.
WING AREA	175 sq. ft.	175 sq. ft.	175 sq. ft.
LENGTH	29.5 ft.	29.5 ft.	29.5 ft.
HEIGHT	9.93 ft.	9.93 ft.	9.93 ft.
	4630 lbs. take-off allows for 5 people, full gas and oil load, plus 295 lbs. baggage and optional equipment.	4600 lbs. take-off allows for 4 people, full gas and oil load, plus 126 lbs. baggage and optional equipment.	4300 lbs. take-off allows for 2 people, full gas and oil load, plus 165 lbs. baggage and optional equipment.

* Maximum Landing Weight, 4600 pounds

NOTE: Single-Engine Service Ceiling increases over 425 feet each 30 minutes of flight.

Specifications subject to change without notice

STANDARD EQUIPMENT

INSTRUMENTATION

Airspeed Indicator
Ammeter
Clock
Dual Fuel Gauge
Dual Manifold Pressure Indicator
Dual Fuel Pressure Gauge
Dual Tachometer (Electric)
Dual Vacuum Systems
Electric Free Air Temperature Indicator
Electric Turn and Bank
Flap Position Indicator
Fuel Selector Light on Rheostat
Gyro Horizon and Gyro Direction Indicator
Gyro and Vacuum Test Valve Four Positions
Heated Pitot Head
Heated Stall Warning Indicator
Landing Gear Position Lights
Lighted Magnetic Compass on Rheostat
Rate of Climb
Red Instrument Post Lighting Four Zone Rheostat Controlled
Red Switch Panel Lights on Rheostat
Secondary Red and White Flood Instrument Lights on Rheostats
Sensitive Altimeter
Turn and Bank Indicator Test Light
Two Engine-Driven Vacuum Pumps
Two Engine Gauge Units (Oil Temperature, Oil Pressure, Cylinder Head Temperature)

CABIN EQUIPMENT

Ash Trays (Four Individual)
Adjustable Fore and Aft and Tilting Front Seats
Adjustable Rear Seat Back
Baggage Compartment Light
Coat Hanger Hooks
Double Rear Windows
Eight Cool Air and Heater Outlets
Engine Controls — Friction Lock
Foam Filled Seat Cushions
Four Arm Rests
Four Directionally Controlled Ventilators
Genuine Leather Trim
Individual Rudder-Elevator and Aileron Trim Tabs and Position Indicators and Controls
Internal Surface Control Lock
Magazine Map Pockets (Back of Front Seats)
Map Glove Compartment
Mixture Control — Index Plate
Outside Baggage Door
Parking Brake
Pilot Window — Full Opening
Rear Window Curtains
Stewart Warner Cabin Heater Thermostatically Controlled
Super Soundproofing
Tinted Windows
Two Cigar Lighters
Two Sun Visors
Utility Shelf
Windshield Defoggers

ELECTRICAL

Battery (24-Volt Electrical System)
Cabin Radio Speaker
Electrically Operated Flaps
Electrically Operated Landing Gear — Manual Auxiliary
Landing Gear Warning Horn
Landing Light — Left Wing
Position Lights and Strobe
Two 25-Amp. Generators and Voltage Regulators
Two Dome Lights
Two Electric Auxiliary Fuel Pumps with "Prime-Off-On" Switch Control
Two Push-Button Starters

ENGINE

Air Induction System Heater
Dual Fuel System
Exhaust Mufflers
Fuel Injector Equipped Engines
Fuel Strainer Drain Control
Induction Air Heater
Two Engine-Driven Fuel Pumps
Winterized Oil Coolers

GENERAL

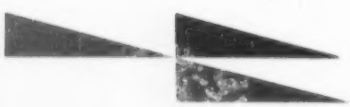
Castoring Steerable Nose Wheel
Fully Retractable Double Step
Hydraulic Tee-Operated Brakes
Four Quick-Drain Valves
Safety Wing Tip Fuel Tanks
Towing Bar

FLIGHT/SWEEP DESIGN...A CONC
W

Long, low aerodynamically clean flight/sweep engine nacelles extend to trailing edge of wing to give the 310d a clean, going places look. Dihedral tilting and minimum frontal area adds speed by cutting drag and increasing lift.

Steerable nose wheel permits "on-a-dime" pivotal turns. Powerful taxi light automatically turns with the nose gear. Toe-touch hydraulic brake system provides smooth, safe, controlled stops, longer brake life and lower maintenance.

Time-tested, all-metal, full-feathering, controllable, constant-speed propellers require no external pressure lines from the engine for feathering or unfeathering . . . assures added safety and less maintenance.



Extra wide cabin door contoured high into the roof line and fully retractable steps provide natural walk-in entry and walk-out exit. Advanced design door features triple safety locks and improved sealing refinements.

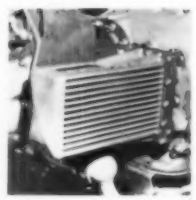
Electrically operated, split-type, dual-purpose flaps offer high lift for shorter, high-performance take-offs. Extra large flap surfaces provide high drag for shorter landings.

Spacious baggage compartment provides 200 pounds of baggage . . . enough for a transcontinental trip! New positive-action doorstop automatically holds door open to make loading and unloading simple and easy.

Streamlined safety tip tanks place main fuel supply far outside cabin section for extra safety. Flight/sweep tank design causes an increase in lift by an amount equal to 3½ feet more wing for greater stability and smoother flight.

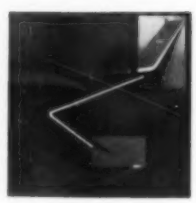
Optional propeller anti-ice system and wing and horizontal stabilizer deicers give the 310d a great, new safety margin for all-weather flight utility.

Pilot is provided full flight/sweep all-weather vision by a glare-proof, wrap-around windshield. Extra large tinted "panoramic" side windows provide passengers all-around visibility. Tapered nose gives pilot ground-sweep view during taxiing or parking.



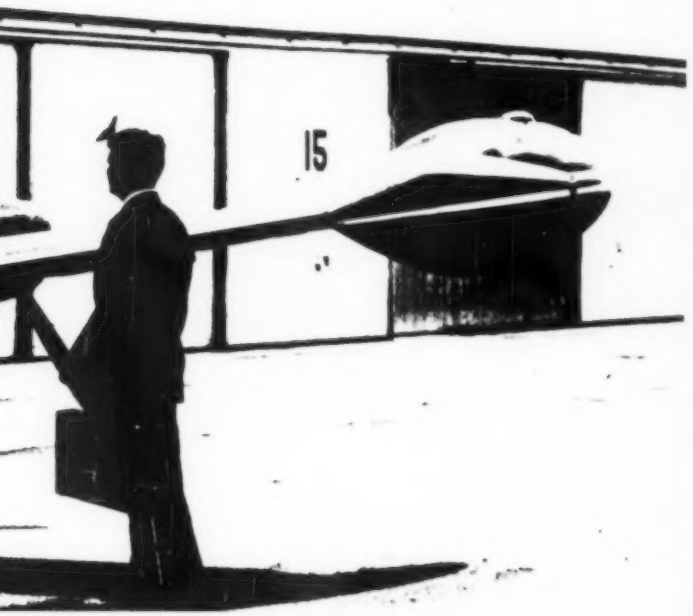
New thermostatically regulated non-congealing oil cooler is standard on the 310d. Automatically controlled, it assures proper oil temperature for correct engine lubrication in the most extreme weather conditions!

Two-speed, electrical auxiliary fuel pumps, installed in each tip tank automatically assure maximum safety by providing alternate, fuel-flow independent of the engine-driven fuel pumps.



New connected controls for rudder and aileron is on the flight/sweep 310d for '60 . . . included to provide superior lateral flight stability, the new system greatly simplifies pilot control techniques.

NCEPT IN KEEPING WITH TOMORROW



Jet augmenter cooling combined with an exclusive, new "flight-quiet" muffler design assures adequate cooling at all times for more efficient engine operation . . . effectively reduces and absorbs engine exhaust sounds at their source.

Everything within easy sight — easy reach on the new 310d flight/sweep instrument panel. Functional grouping of instruments, switches, and radio equipment provides constant "eyes-on-the-road" operation and adjustment of instruments.

New fuel strainer drain control, has been added to make draining of fuel strainer during pre-flight inspection checks simple, easy, and clean.

Twin 260-HP Continental engines with continuous flow fuel injection gives top speeds up to 242 mph and brings an entirely new concept of performance, safety, dependability, and economy to the "light twin" field. Proven by over a million miles of trouble-free flight, the 310d power plants provide the extra-bonus benefits of smoother operation, greater economy, increased range, higher horsepower, better acceleration, freedom from icing, reduced maintenance, longer spark plug life, more safety and reliability, lower cylinder head temperatures, and improved starting.

Complete trim controls; elevator, rudder, aileron; are located within easy reach. Control pressures are eliminated for relaxed, hands-off flight. Each trim system incorporates position indicators for fast, positive identification.

anywhere...anytime...a d
tinguished record of exe
utive travel achieveme

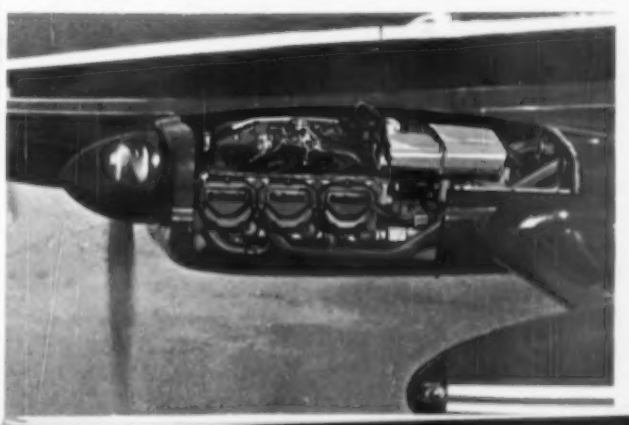
Time and distance business barriers vanish under the sleek wings of the disting 310d. You move far, fast, and flexibly . . . solving problems . . . explorin opportunities — wherever and whenever they exist. And the conference room qu the unmatchable beauty, comfort, and convenience of the 310d provides a perfec to plan as you travel — a private office in the sky! The new flight/sweep Cessn halfway across the nation — non-stop . . . provides executive lounge comfort for at speeds up to 242 miles per hour. All this plus true twin-engine safety and perfor

TWIN ENGINE SAFETY

True twin-engine performance and safety is much more than a matter of two engines. And the great new flight/sweep 310d more than matches all true light twin standards! Under emergency conditions, safe take-offs are assured with a 440 feet-per-minute, single-engine rate of climb at maximum gross weight. For normal, twin-engine take-offs, you still get the GREATEST rate of climb — 1800 feet per minute! And complete dual systems . . . featuring two of everything that counts . . . gives you an extra margin of safety.

FLIGHT/SWEEP "GO LOOK"

The dynamic new "go look" of the gracefully silhouetted 310d is h the fabulous new flight/sweep tail . . . business aviation's top consi for '60 . . . Sleekly set at a jet-thrust angle, it cuts cleanly through the important men on important missions leave their competition behind! Even on the ground the new lower, longer 310d is complemented by the tail . . . giving a restless look for extra power, extra mobility and extra today's man on the move!



here...anytime...a dis-ished record of exec-travel achievement

business barriers vanish under the sleek wings of the distinguished fur, fast, and flexibly . . . solving problems . . . exploring new nerever and whenever they exist. And the conference room quietness, auty, comfort, and convenience of the 310d provides a perfect place el — a private office in the sky! The new flight/sweep Cessna ranges nation — non-stop . . . provides executive lounge comfort for five . . . miles per hour. All this plus true twin-engine safety and performance!

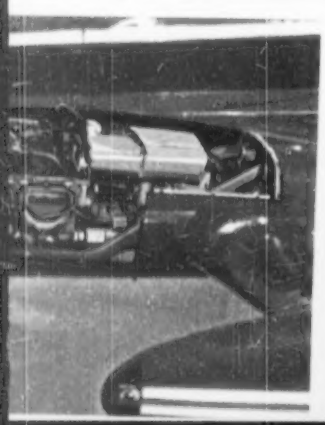
ETY

s much more than a matter of two engines. more than matches all true light twin tafe take-offs are assured with a 440-feet- at maximum gross weight. For normal, twin- TEST rate of climb — 1800 feet per minute! two of everything that counts . . . gives

FLIGHT/SWEEP "GO LOOK"

The dynamic new "go look" of the gracefully silhouetted 310d is highlighted by the fabulous new flight/sweep tail . . . business aviation's top design innovation for '60 . . . Sleekly set at a jet-thrust angle, it cuts cleanly through the sky, helping important men on important missions leave their competition behind!

Even on the ground the new lower, longer 310d is complemented by the flight/sweep tail . . . giving a restless look for extra power, extra mobility and extra prestige for today's man on the move!



poised, powerful, pre
"the world's best all-around

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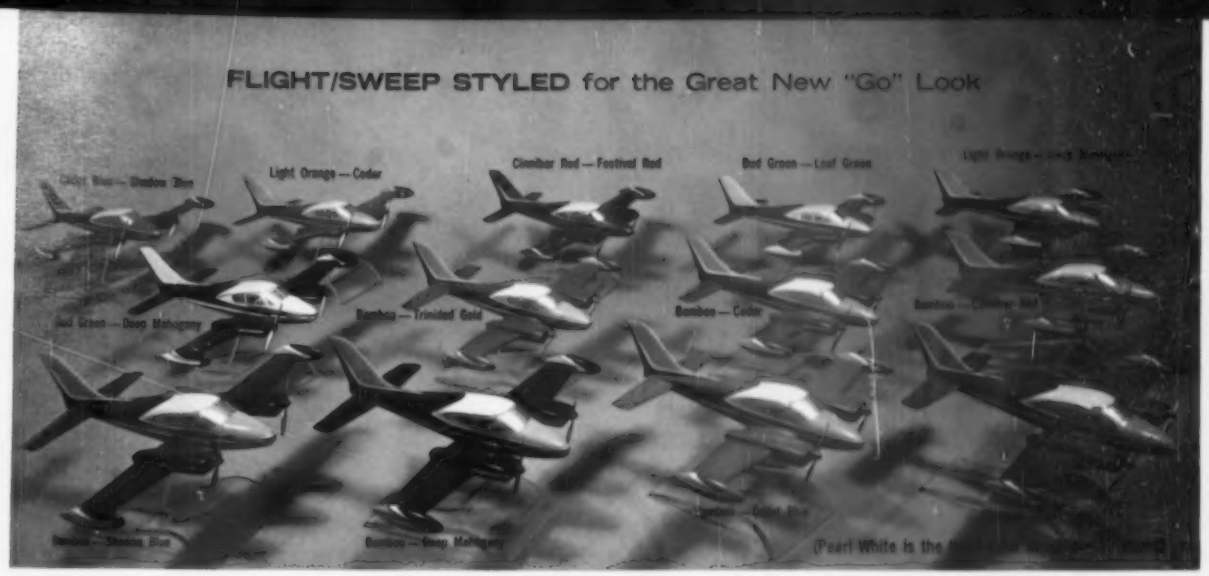
FLIGHT/SWEEP STYLED for the Great New "Go" Look
Light Orange — Cedar
Cinnabar Red — Festival Red
Bud Green — Leaf Green
Bamboo — Cedar
Bamboo — Trinidad Gold
Bamboo — Deep Mahogany
Bamboo — Sheaves Blue
(Pearl White is the

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310d

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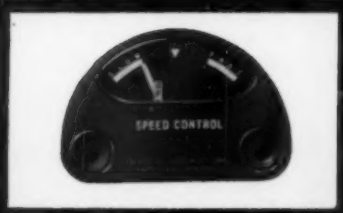

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WHITE PLAINS, NEW YORK

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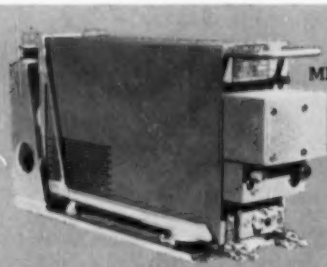
The DADF-1 is rugged, too. The sealed loop has rhodium plated contacts for long life and trouble-free operation. See the DADF-1 at your Dare distributor today.



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(Continued from page 16)

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Story of the Marine Corps on land and in the air from its beginning to present through 434 illustrations and running narrative.

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Just To Be Worthy

GILL ROBB WILSON
Publisher

AS the decade of the sixties comes up on the speedometer of the years, I am reminded that in this relative period a full century ago my father was born—and is happily still hale and hearty. What a sweep of evolution and revolution for the span of one life to encompass—more notable plateaus of fresh knowledge and achievement in a single century than in all previous recorded time!

I often wonder if the quantity and quality of progress produced by the past century will continue undiminished in the century ahead. Sometimes this seems unrealistic, yet if one is knowledgeably aware of the upcoming challenges and of the unfolding possibilities and has any appreciation of the continuity of history, it is clear that we all have been born far too soon. Most of the pioneering and excitement lies still ahead. I deem this more important to the prospects of the coming generations than any possible assurances of social security, luxurious living standards or greater leisure.

Possibly one of the concepts which the future may have difficulty in preserving amidst the routines of big government, organized labor, professional management and automation is the eternal significance of the individual human being. It is so easy to forget that throughout civilization the great divisions of history have been inaugurated by some one or other monumental character rather than by some geological, political, creedal or genetic fact—Jesus of Nazareth, Moses, Confucius, Mohammed, et al to wit. Furthermore, each fresh plateau of notable progress has been designed and blueprinted by some lone and often lonely intellect. Those who would turn over their welfare to the state or to any other type of organization might do well to remember the testimony of time.

But why should an airman have more interest in or responsibility for the sixties than any other citizen? For a very substantial reason. The airman is beyond any other the author of this age. The world's vulnerability is the work of his hands. The fact that humanity is face to face with moral and spiritual equations as a cold matter of survival lies at the feet of the airman. That flight and its fateful spawn of nuclear science, electronics, astronautics and sundry scientific fallout has demanded a new order of society can be charged to the aviator.

As this is written, President Eisenhower is homebound above the North Atlantic on the last lap of his quest of the Holy Grail—the peace of the world. Probably there is no experienced pilot in all America who is not in spirit with him, quietly proud that flight is a medium for the missions of men of good will as well as a weapon for the waging of war. Additionally, many of us who know our world mark that the feet of our President were for the most part of his questing under the tables of men of dusky skins and strange Gods—and we mark that this is well for unless the education of fellowship runs ahead of the political and economic awakening of the pigmented masses of Asia and Africa, the physical unity achieved for the creeds and breeds by flight may prove a curse.

But it is not enough that as an airman I go in spirit with the President to reconcile the problems of racial, creedal and economic differences around the world. If I am squarely to face my responsibility for the part I have played in the airman's world, I must do it as an individual on the streets of Los Angeles and New York as well as theoretically on the streets of Karachi and Casablanca. I must broaden my interest to search for any and every agency or medium which can anticipate such tragedy as war and its companion horsemen. I have no claim to be a true airman and a confrere in the authorship of a better era unless the effects of the air age as well as its instruments are my concern. Of course, it is possible to disclaim any special responsibility for having changed the face of history and to write the whole thing off as having been another way to make a living—another day, another dollar. But this seems beneath the dignity of life.

My father, in his tenth decade, tells me that it has been less of a task to maintain faith in God than in man. Abuse and neglect of the scientific miracles and natural resources and production triumphs which unfolded in his day, he assures me, was a greater cause of concern to a thinking man than was any lack of ingenuity.

I recall in Holy Writ the fate of the individual who was entrusted with a certain heritage of talents and failed in appreciation of them. They were taken from him and given to another.

Today I look out on this airman's world with its myriad of miracles for the welfare and edification of mankind. It has been a rare privilege to play a part in creating the climate in which they could come into existence.

But I note their foreshortened use to great purpose and their abuse for tawdry wealth and I do not wonder so much about what scientific miracles shall grace the sixties as I wonder about how to persuade the Creator that the sixties should not be taken away from us and given to another.

Just to be worthy to live deservingly in the next ten years seems at this point an Herculean task—they will be so abundant.

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FEDERAL AVIATION AGENCY

MISSION AND FORECAST

The Federal Aviation Agency has completed its first year, mainly devoted to organization, and enters 1960 at the accelerated pace that will be essential if it meets its Congressional obligation to fulfil civilian and defense requirements for safe, efficient, dependable air travel. In recognition of the importance of this agency, and the demand for knowledge of its progress, FLYING *presents a summary of FAA's organization and program.*

MISSION

THE FEDERAL AVIATION AGENCY was created by Act of Congress, August 28, 1958, as an independent organization to absorb the functions of the Civil Aeronautics Administration, with added powers.

The main purpose of the change was to work out the best future utilization of airspace by all users, civil and military, under a common system.

At the year-end, FAA assumed responsibility for most of the Government's work in civil aviation, except for the regulatory and safety powers of the Civil Aeronautics Board.

FAA's duties include:

- *Promotion:* Encourage and foster civil aviation and air commerce in the United States and abroad.
- *Air Navigation:* (a) Develop, test and evaluate systems, procedures, and facilities. (b) Facilities: acquire, establish, improve, and operate.
- *Airspace:* Formulate policy and assign airspace by rule, regulation, or order.
- *Traffic:* Make rules and regulations for air traffic and flight of aircraft.
- *Airports:* (a) Review locations or modifications proposed for airports, landing areas, and missile and rocket sites, to assure conformity with airspace policies, public interest, and national defense. (b) National Airport Program, give financial and technical aid to State and local public airport authorities. (c) Nation's Capital, operate nearby civil airports.
- *Charts:* Arrange publication of aeronautical charts and maps.
- *Information:* Collect and disseminate, relative to civil aeronautics.
- *Aircraft:* Undertake or supervise development work for improved aircraft, engines, propellers, and appliances.
- *Safety:* (a) Make rules and regulations governing flight procedures and operations. (b) Administer certification of airmen, flying and maintenance schools, and repair stations. (c) Determine airworthiness of aircraft and components.

Regions and regional offices of the FAA.

special statement by the Administrator

"The FAA is doing everything in its power to strengthen general aviation. We have firm confidence in its ability to help itself and to further its own interests within the framework of the safety regulations."

By E. R. QUESADA

Administrator, Federal Aviation Agency

GENERAL AVIATION will continue its dynamic growth in 1960 and in the years that follow. The new decade promises to be one of immense progress, when much that was considered wishful thinking in past years will become practical reality.

Stimulated by a prosperous economy and the increasing utility of the airplane, production figures are showing a strong demand for the larger single-engine types, and the demand is brisk also for the light twins. These latter planes fill a need among corporate and business flyers for a high-performance airplane at prices well below those of the larger multi-engine transports. Helicopters are coming into their own and are being used by business in increasing numbers.

The next five years will be marked by greater use of turbine powered aircraft in general aviation. Five Viscounts are already in service, and early in this new year 20 Fairchild F-27s were in the hands of corporate customers. Forty-two turboprop Grumman Gulfstreams are on order, with deliveries scheduled at the rate of four per month in 1960. One Lockheed Electra will be delivered early in the year, and considerable interest is indicated in the new Lockheed ten-passenger JetStar, with 62 conditional sales reported to industrial buyers.

The general aviation fleet flew an estimated 12 million hours in 1959. Of this figure more than half was for direct business purposes, and the great proportion of the balance related in some manner to the business of the user.

More and more comparatively small business firms are discovering that the airplane gives them a competitive edge. Before long the company without one will find itself out of the running.

Not only organizations, but individuals are finding the personally owned airplane a necessity as well as a convenience; professional people, farmers and ranchers, for example, are purchasing aircraft for their private use, combining business with pleasure.

Flying for the sheer pleasure of it has made a comeback in the past few years, so much so that it now ranks second only to business flying in total hours flown—an estimated 2.3 million in 1959.

Commercial flying, the term used to designate the specialized use of the airplane for charters, crop dusting, spraying, fertilizing, mapping, surveying, power and pipeline patrol, etc., was third with 2.2 million hours. Training and instructional flying made up the balance, roughly two-million hours. These are figures to reckon with—three times as many hours in general aviation as all the domestic airlines put together, in 1959.

We expect the active general aviation fleet to rise to 83,000 by January 1, 1965, which is 22 per cent higher than the 67,839 in operation on January 1, 1960.

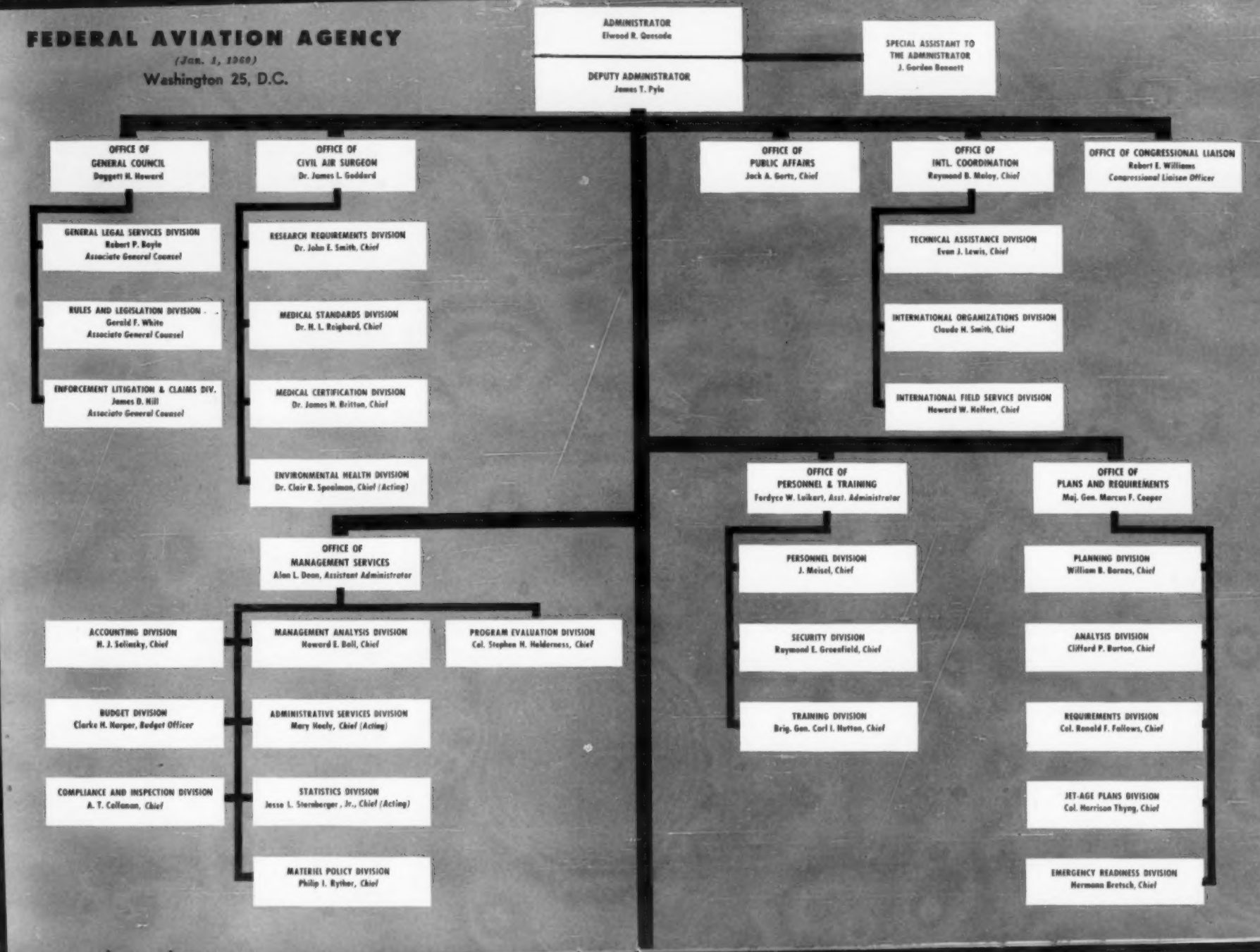
In the face of this great expansion—FAA forecasts indicate 14 million hours in 1962; 16 million by 1965—a critical situation is developing in regard to general aviation airports. Our figures show that there are presently some 6,500 of these, about 60 per cent of them privately owned. Two years ago there were 7,300.

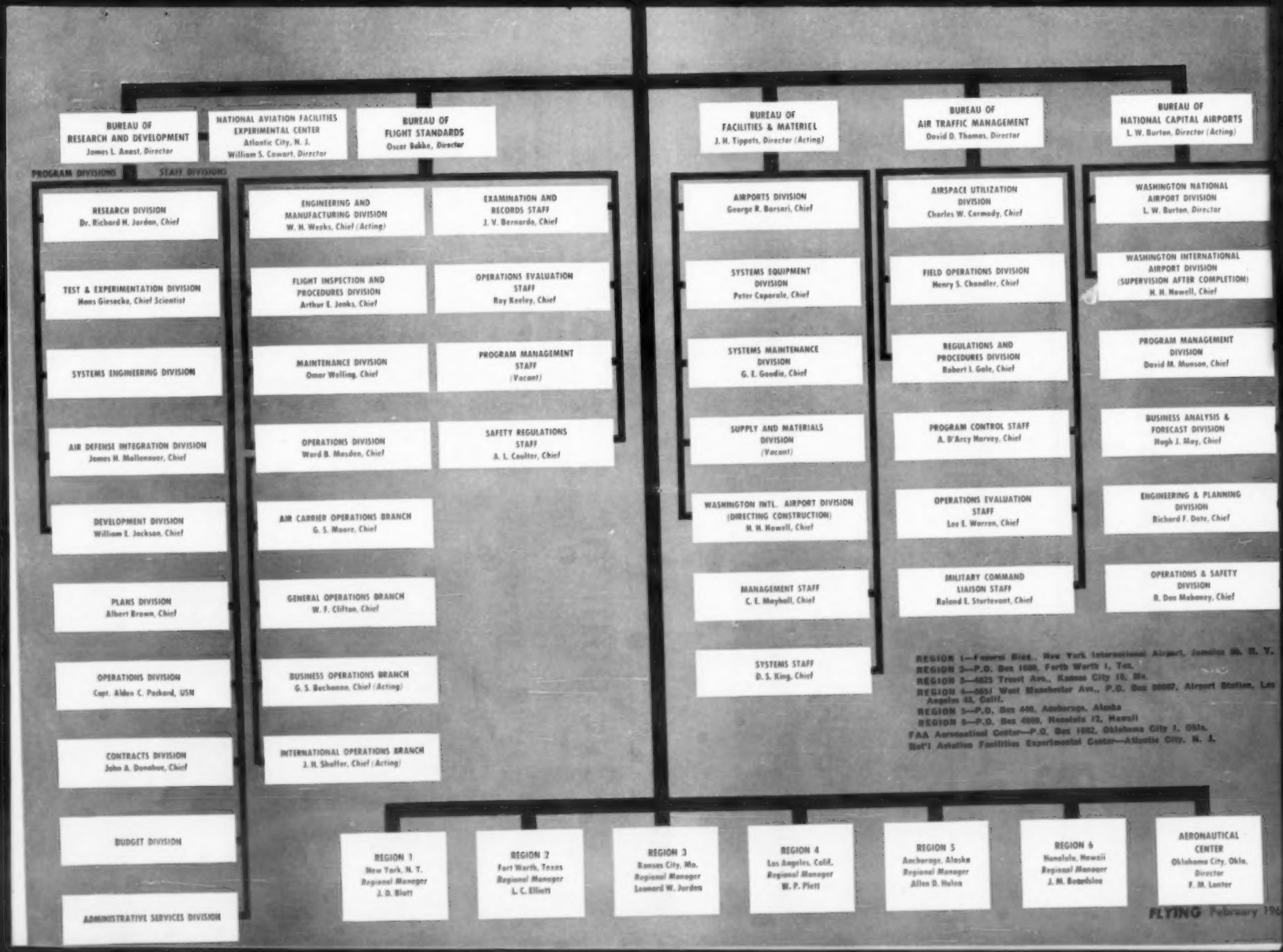
This is a disturbingly high mortality rate—a dwindling supply of airports in the face of a growing demand for flying services—and it could seriously impair general aviation's bright future. Airports which should be preserved for the needs of local communities are being turned into housing developments and shop- (*Continued on page* 100)

FEDERAL AVIATION AGENCY

(Jan. 1, 1960)

Washington 25, D.C.

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ENGINEERING & PLANNING DIVISION
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OPERATIONS & SAFETY DIVISION
R. Don Mahaney, Chief
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REGION 2—P.O. Box 1689, Forth Worth 1, Tex.
REGION 3—4825 Troost Ave., Kansas City 10, Mo.
REGION 4—5651 West Manchester Ave., P.O. Box 90007, Airport Station, Los Angeles 45, Calif.
REGION 5—P.O. Box 440, Anchorage, Alaska
REGION 6—P.O. Box 4009, Honolulu 12, Hawaii
FAA Aeronautical Center—P.O. Box 1082, Oklahoma City 1, Okla.
Nat'l Aviation Facilities Experimental Center—Atlantic City, N. J.
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New York, N. Y.
Regional Manager
J. D. Blatt
REGION 2
Fort Worth, Texas
Regional Manager
L. C. Elliott
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Kansas City, Mo.
Regional Manager
Leonard W. Jordan
REGION 4
Los Angeles, Calif.
Regional Manager
W. P. Plett
REGION 5
Anchorage, Alaska
Regional Manager
Allen D. Hulen
REGION 6
Honolulu, Hawaii
Regional Manager
J. M. Beardslee
AERONAUTICAL CENTER
Oklahoma City, Okla.
Director
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FEDERAL AVIATION AGENCY

BUREAU OF

Research and Development

By CAPT. A. C. PACKARD
Deputy Director

James L. Anast, Director

THE ROLE of the aviation engineer or scientist is still a pioneering one. Not only did it take a hero to fly the planes of the aviation pioneers but many times the hero had to be, in part, an engineer, a mechanic or a scientist.

FAA's Bureau of Research and Development is today pioneering much of what will be standard in tomorrow's aviation. Under direction of James L. Anast, an engineer executive who left industry to return to an old love, the Bureau is driving hard to modernize the airways. Research and Development knows that it must "attack on two fronts" to develop equipment needed for modern air traffic control and to carry out the research for future needs.

The Bureau was formed to establish and unify a research and development program for military and civil airways operations. The mission of the Bureau is to accomplish the following three things:

- In-service improvements with currently available equipment.
- To exploit systematic application of existing technology for earliest possible use to meet the increased traffic load, while at the same time maintaining requirements for increased safety and expeditious traffic handling.
- A long-range development of new equipment and concepts to meet future requirements.

The research and development effort of FAA is managed under the systems engineering concept, applying scientific method and logic to the design, development, and continuing improvement of the complex system of air traffic control and air navigation in the United States.

The Bureau of Research and Development currently is pursuing 96 major projects. Each project is placed in one of these eight areas: System Research, Aircraft Data Acquisition, Navigation, Communications, Data Processing and Display, Airport, Weather.

Major aspects of the research and development program include:

Introduction of automation to the management of air traffic by 1963.

Joint use of air defense facilities for air traffic control as well as military operations.

Automatic communication between pilots and the ground for routine air traffic control.

Cooperative weather research involving FAA, Weather Bureau and Air Force for introduction of automation for gathering and distributing weather information.

Development of an all-weather landing system coupled with the development of means to improve surface operations after landing.

The National Aviation Facilities Experimental Center at Atlantic City, N. J., is the (*Continued on page* 94)

FORECAST

BUREAU OF

Facilities and Materiel

By JOSEPH H. TIPPETS,
Director

Joseph H. Tippets

SINCE THE modern Federal Airway is in effect an electronic highway in the sky, no one ever sees it. In the same way, few people ever see the engineers and technicians of the Bureau of Facilities and Materiel that create the airway and keep it in repair.

The importance of our work is shown by our budget. Split into a cost of $115 million for maintenance and $118 million for establishment of facilities during fiscal year 1960, this $233 million is a large portion of the FAA budget.

We build and maintain the Federal Airway System and buy all the equipment needed for this system. Briefly, the Bureau of Facilities and Materiel mission is to perform FAA's engineering, procurement, construction and maintenance of all air navigation facilities.

Facilities and Materiel has laid down plans to expand the entire air traffic system: more control centers, towers, radar, communications and air navigation equipment.

For the immediate future (through fiscal 1960) funds are available for the construction of 15 air route traffic centers which will become transition terminal centers when FAA's en route function is integrated with the U.S. Air Force Semi Automatic Ground Environment (SAGE) air defense system. It should be noted that FAA will not add 15 additional centers, since the new centers will be replacing older quarters unsuited to modern air traffic control.

Associated with the transition/terminal centers and the airport towers is a variety of sophisticated electronic equipment:

Radar, one of the chief working tools of the traffic controller, is slated for a big increase.

Long range radar for air route traffic control centers, now numbering 35, will increase to approximately 65 by January, 1962.

Radar beacons for quick identification of aircraft aloft are scheduled to be added to both centers and towers.

A new three dimension radar, now being developed by FAA, will add altitude to the information now available to controllers. These are scheduled to be installed by 1966.

The prime function of the Bureau of Facilities and Materiel is to get facilities built and keep them operating—the systematic assembly of buildings, radio equipment, wires, powerplants, and approach and landing lights which provide the user of the airspace with communications and navigational guidance. Such facilities and services essential to safe and efficient flight comprise the Federal Airway System.

The system includes widespread air-ground and point-to-point communications; dissemination of weather; airport and airway information to pilots; equipment used in the control of air traffic. The system serves both civil and military traffic.

Complementing the Federal Airway System is a nationwide system of airports. The Federal Airway System is financed and operated by the FAA, but the airport system, while financed by matching federal with local funds, is operated and maintained by non-federal agencies.

Responsibilities of the Bureau of Facilities include the engineering and procurement, construction and operational maintenance of the facilities in (*Continued on page 72*)

BUREAU OF

Flight Standards

By OSCAR BAKKE, DIRECTOR

Oscar Bakke

THE FLIGHT IS NO. 7, nonstop jet New York to Los Angeles. At runway end, the captain is giving his engines full throttle, testing for maximum power-check—evidence of the Bureau of Flight Standards at work.

But long before Flight 7 was announced—long before tickets were sold, the pilots, engineers and technicians of the Bureau of Flight Standards had certificated the plane's design and construction; had flown and tested the original model.

Other Flight Standards personnel had: flown with and approved the competency of the pilot, copilot and flight engineer; had flight tested the take-off and landing procedures; flight tested and approved the navigation aids that guide the plane on its trip across the nation; tested and approved the navigation facilities at the air terminals.

The role of the Bureau of Flight Standards is one long search for safety. It begins at the drawing board where an airplane is designed. Flight Standards engineers working in the aircraft factories check these designs against their standards; determine that the airframe, and all its parts will support not only its regular flying burden but also the stresses and strains of emergency conditions. They follow the plane through its model stage, its performances in wind tunnels, and on through a myriad of tests.

As the craft progresses, Flight Standards interest doubles. Individual parts are tested. The intricate toolings, the finely stamped pieces are carefully scrutinized and compared with FAA standards.

One day the new plane is rolled out and examination procedures go airborne with Flight Standards test pilots at the controls. The Federal Aviation Agency's (30 or more) test pilots subject the craft to maximum flight conditions in tests totaling up to 400 hours. All this must precede FAA's Certificate of Airworthiness which hangs on the cockpit wall of the plane.

Last year, American manufacturers produced eight entirely new transport types, eight new types of helicopters, and 16 new types of personal aircraft. All had to be certificated. In addition, Flight Standards awarded type certificates to 56 new models of engines and 80 new types of propellers. Included in the new transports were three jet airliners.

The certification program does not end with issuance of an airworthiness certificate. After an aircraft or product goes into service, it is periodically inspected for evidence of engineering and manufacturing deficiencies. During 1959, Flight Standards issued 120 directives to correct deficiencies discovered under actual operating conditions.

Flight Standards is also concerned with any major change that might affect the safety of any individual airplane. Last year, more than 15,000 such changes were examined. This same careful scrutiny is constantly applied to the hundreds of VORs, ILSs, radar, etc., which mark America's 215,000 miles of Federal airways. It is imperative that they be constantly flight checked. To this end FAA regional inspectors, in specially equipped planes, flew more than a million miles last year. More than 500,000 miles were flown at high jet altitudes and 850,000 at intermediate altitudes used by piston-engined planes. FAA inspection crews logged 41,400 flight hours testing the accuracy of 910 primary

electronic aids to air navigation. FAA's fleet of 76 inspection planes includes two adapted B-57 jet bombers.

But FAA's inspection and testing is only part of the story. The American aviation industry is dynamic. Every year new planes are added, new instruments invented, new air routes established. This all brings demand for new standards, new criteria of safety. This demands a system and the system must be uniform and inclusive. It must be sufficient to cover the flight of a plane manufactured in California, piloted by an airman trained in Kansas, operated by a company with headquarters in Pennsylvania. It must be inclusive enough to cover everything from major policy decisions to detail for spark plugs and oil filters.

The beginning and end of the Flight Standards process is in 147 FAA district offices located at major airports around the country. Each office serves as a center from which FAA personnel monitor local flying activities. Each has a specialist mechanic charged with observing local maintenance procedures at some 628 aviation repair stations scattered throughout our nation. They also monitor the work of the industry's 107,000 mechanics and periodically spot check their tools and manuals.

But preoccupation with planes, machines, mechanics and tools is only part of the local FAA effort. The pilot himself, the school that trains him, the instruction he receives—all these are subject to inspection.

Most airmen know the local FAA offices as the place where they took their original private pilot's examination. But few realize there are 35 varieties of these examinations—one for each special branch of airmen's and mechanics' knowledge. These examinations, also prepared by the Bureau of Flight Standards, must reflect the growth and increasing sophistication of the American aviation industry. They must be constantly changed and adapted. Last year, FAA local officials administered 105,000 different examinations, an increase of eight per cent over the previous year.

THESE local officials working on the nation's airfields, also act as an intelligence force. Their reports, recommendations, and the forms they file are every day being forwarded to the Bureau of Flight Standards in Washington. This material collected from FAA's 147 district offices serves as a daily fever chart of the nation's air operations. Reports from several different offices might, for example, indicate a common pilot weakness. Other repair records might show a common engine deficiency, or the need for reinforcing elements of an airframe. Other records of incidents in flight might indicate a need for new or better instruments.

These reports, indicating that somewhere along the line safety is being exposed, trigger the Flight Standards system. Remedial action is proposed, debated. If adopted, it is immediately issued as a public document to the nation's airmen. Such regulations, restrictions, advice, or information are sent out in the form of Civil Air Regulations, Regulations (*Continued on page* 101)

FORECAST

The Flight Standard plan for the future is based on the premise that the carrier fleet during the next five years will show a decrease in numbers but an increase in capacity resulting from a shift to turbine-powered aircraft.

This transition to turboprops and pure jets is expected to increase the carriers' revenue passenger miles from about 6.4 billion miles to 10.5 billion in 1965, or about 64 per cent.

This growth of turbine service and its resulting expansion of carrier operations will necessitate a continuation and increase of specialized jet training for the Bureau's staff.

The transition to turbine-powered aircraft will not be limited to the carrier fleet. FAA planners foresee further growth in the size of the general aviation fleet with a continuing shift to larger and faster aircraft—particularly turbine-powered aircraft.

The FAA anticipates that the current fleet of approximately 68,000 general aviation planes will increase to about 83,000 by 1965. In terms of hours, this general aviation fleet is expected to log about 16,000,000 hours of flight time in 1965. This will mean an increase of 33 per cent over the estimated 12,000,000 hours flown by general aviation planes in 1959. This growth and this change in the general aviation fleet will necessitate further expansion and additional special training in all operations of the General Operations and Business Operations Branches.

END

The crew of an FAA flight inspection DC-3 check radio signals transmitted by FAA ground facilities.

BUREAU OF

Air Traffic Management

By DAVID D. THOMAS, DIRECTOR

David D. Thomas

TODAY'S AIR TRAFFIC control system is made up of approximately 165,000 miles of Federal airways linking over 600 U.S. cities and towns. These airways, which have assigned route numbers similar to surface highways, are served by 33 air route traffic control centers, 212 airport traffic control towers, 352 air traffic facilities. Approximately 15,000 FAA employees carry out the various functions of the control systems.

Our problems stem from the fact that aviation has expanded far beyond the present capacity of the system. We have over three million square miles of airspace over this nation but its availability is diminishing just when we need it most.

Here are examples of how our air traffic has grown: In 1950 itinerant operations numbered 7,750,000. For 1960 the forecast is for 22 million. In 1958 towers reported 1,110,000 instrument approaches. For 1960 the forecast is 1,600,000. Today 110,000 aircraft use the airspace. In 1938 there were only 22,000. Some estimates for 1975 air traffic predict doubling that of today. The demand for traffic control under instrument flight rules is expected to increase ten times.

Jet flight, too, created new problems. It has made necessary, for example, a new set of high altitude air routes not previously available to civil aircraft. Jets close at such a high rate of speed that man can no longer count on his physical resources to avoid collision. In traffic control, using the ANC (Air Force, Navy, Civil) criteria, up to 100 miles of space must be clear between aircraft to maintain the minimum separation of ten minutes.

Looking at the system and its actual traffic, what do we have? (1). More airplanes in the system than it can accommodate. (2). Aircraft with a wide diversification of performance characteristics. (3). Certain areas with heavy concentration of air traffic; others with very little. (4). Planes operating under instrument and visual flight rules in the same airspace. (5). And underlying the entire system is the inherent slowness of the present method of processing flight data for control purposes.

All of which spells out two very unhappy results: costly delays and threat of mid-air collision. True, the system has produced an excellent safety record over the years, but at cost of severe operating restrictions.

These are some of the things being done to improve the present capacity of the system.

In navigational aids, we are converting from the old low-medium frequency 4-course radio range, which will often break down in bad weather, to VOR and VORTAC facilities. VOR gives static-free reception under all weather conditions in addition to a 360-degree course heading. By the end of June 1960 we will have placed approximately 700 VORs in operation.

The VORTAC is a combination VOR and TACAN, a military facility which incorporates both direction and distance information into a single piece of equipment. At the present time VORTAC is the basic element of the civil-military common system. To utilize the VORTAC, of course, the aircraft must also be equipped with distance measuring equipment to communicate electronically with the ground facility.

By July 1960, we plan to have 360 complete VORTACs in operation: in five years 1,100. We are

also installing new and improved radars as fast as they are available. By 1962, 84 long range radars will provide coverage above 15,000 feet up to a 200-mile range over most of the country and to lower altitudes on high density routes.

By the end of 1961, 82 airport surveillance radars will be in operation. These terminal radars detect aircraft within a 50-to-60 mile radius and up to altitudes of 25,000 feet from the antenna. They cut down the time interval between successive landings and departures at major terminals.

To provide better radar identification of aircraft and improved tracking in bad weather, we have established radar beacon capability at 34 long-range radar systems and at 27 additional airport surveillance radar systems by mid-1961. This secondary radar system provides better identification of targets, improved tracking in bad weather, and in some instances better coverage.

A basic shortcoming in today's traffic control system is in the nature of the control operation which, from start to finish, is almost entirely manual, and therefore slow in the processing of flight data. Flight progress strips are made out by hand; fix postings are manual; communications are by voice, interphone and radio, performed by individuals; flight plans and flight progress are analyzed by the controllers themselves; and computations are made manually.

The controller's workload in handling routine operations is steadily increasing while his time devoted to control decisions—presumably his most critical function—is decreased. The number of flights which can be given the advantage of control is thus also decreased.

STANDARD computers have proved quite effective in speeding up the processing and display of flight information and have been installed at six of the centers in the congested northeast section of the country. Additional centers will be receiving computers within the next few years.

Under the computer system, the essentials of a pilot's flight are fed into a machine which computes his progress along the airways within that center's area, recording his time of arrival at every check point en route. The punched card bearing this information is fed into another machine which produces a route slip for the controller's reference, and then deposits the information on that flight in a memory drum which can hand it back in written form any time the controller demands it.

It is in the computer process that automation will make its first great contribution. A special purpose data processing central is now under development for initial installation in FY 1963. It will replace the computers and the existing manual system in all major high density areas.

With this system, control data is relayed automatically between computers located at major airports and traffic control centers. All information required by a controller is displayed on a board in front of him, eliminating the manual posting method.

THE SYSTEM can also search for potential conflicts between aircraft. That is, when a flight plan on an aircraft entering from another center's area becomes active, the computer automatically compares the new plan with all others already in the machine. If a potential conflict is discovered, the computer shows the controller possible corrective alternates for his necessary action.

The Data Processing Central will also be capable of utilizing terminal area radar information in advance of an aircraft's arrival. This will permit the controller to schedule landings well in advance of arrivals and also cut down the time an aircraft must remain in the holding pattern.

The ultimate success of any future air traffic control system will rest in large part on the quality, speed and flexibility of automatic ground-air-ground communications. Coming into the air traffic control system is a communications facility that will increase the capacity of the individual controller to handle a larger volume of traffic. Direct controller-pilot communications will be expanded through use of remotely controlled communications facilities at peripheral sites.

FAA personnel scan the radar scopes at the Air Traffic Control Center, New York International Airport.

The FAA has a contract (*Continued on page* 108)

OFFICE OF Civil Air Surgeon

By JAMES L. GODDARD, M.D.

James L. Goddard, M.D.

CREATION of the Federal Aviation Agency was made necessary by the challenge of an aviation industry that had grown from an infant to a giant in an incredible 50 years, a growth so phenomenal that the problems of adolescence were not cured before those of maturity were pressing.

Because men are inextricably part and parcel of this growth, some of the problems encountered, of necessity, fall within the purview of medicine. To search for and find solutions to these problems, the Office of the Civil Air Surgeon was created by the Federal Aviation Agency.

Perhaps best known to pilots and other airmen for its recent activities in medical rule making, the Office of the Civil Air Surgeon, nonetheless, has a number of other important functions.

The amount of activity in the rule making area during the first year of its existence was a reflection of a need. Prior to establishment of FAA and the Office of the Civil Air Surgeon, there was no medical group with responsibility for making rules. Consequently, medical rule making had lagged far behind rule in other areas.

There had, in fact, been no comprehensive revision of the medical standards for airmen since they were initially established in 1926, and the criteria for the men who fly today's powerful jets are basically unchanged from the medical standards established for the pilots of the 90 mile-an-hour aircraft of 1926.

The responsibilities assigned to the Civil Air Surgeon by the Administrator are designed to provide national leadership in the field of civil aviation medicine. Federal Aviation Agency Order One, dated January 15, 1959, established these responsibilities.

In addition to the authority for recommending standards and regulations for mental and physical fitness for airmen, air traffic controllers and others whose health affects safety in flight, the Office of the Civil Air Surgeon also was given responsibility for administering examination, inspection and certification programs relating to the Agency's medical and physical fitness standards and regulations.

Another responsibility is to carry out needed research in civil aviation medicine. The Office of the Civil Air Surgeon also has the responsibility for evaluating health and medical programs for Agency personnel.

A number of factors have combined both to increase the urgency and to add to the responsibilities of the Office of the Civil Air Surgeon.

The high altitude and high speed operations by air carriers demand increased attention to the development of measures for passenger, and aircrew protection in an increasingly hostile environment.

The scope of the Agency's responsibility to insure effective control of airspace, both for civil and military uses, in peace and in war, requires the development and maintenance of effective means of insuring the continued health, both collectively and individually, of the Agency's highly skilled technical work force.

The disturbing accident rate in general aviation operations has been only partially ameliorated by increased technical proficiency in the building of better aircraft and ancillary equipment. The need to provide for an intensive study of the human aspects associated with these operations has long been neglected.

The growth of civil aviation into a major industry and the consequent exposure of increasing numbers of humans to the problems associated with it has become a matter of serious concern to the FAA.

The ability to profit from a significant portion of the aeromedical work conducted by the military services is rapidly becoming a less secure base as those agencies redirect their activities more and more into areas dealing with space flight and unmanned operations.

To assist the Civil Air Surgeon in discharging his responsibilities, there have been established in the Washington Office four divisions which conform to the four basic functions assigned by FAA Agency Order One. These are the Research Requirements Division, the Medical Standards Division, the Medical Certification Division, and the Environmental Health Division. The Civil Aeromedical Research Center is being established at Oklahoma City for medical research in many medical areas, some of which have remained relatively untouched.

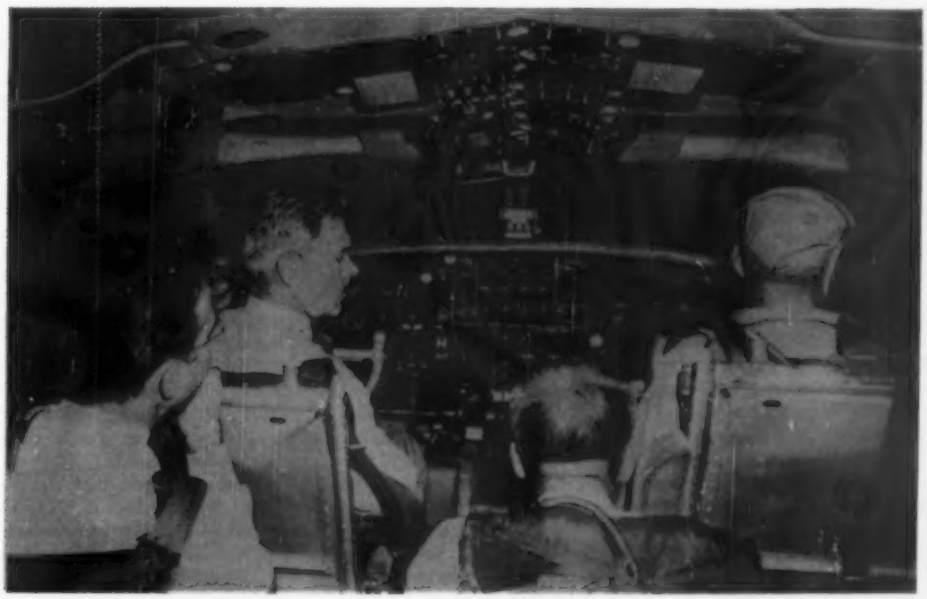
THE Research Requirements Division will provide a central repository of information concerning aviation medical research in progress throughout the world. From a review of this information and from a study of the medical needs of the Agency, determinations will be made with respect to what important gaps exist in our understanding of the medical phenomena related to civil aviation.

When the research needs have been identified, this Division also determines the means by which necessary research can be most effectively carried out. In some instances, the research is performed by the Agency; in others it is performed on contract with private institutions or organizations; in some instances support will be given to existing programs of established educational institutions where the nature of the research shows promise of application to the Agency's medical program.

To supplement research work being performed by others and to initiate research in areas not accommodated by other efforts, the Research Requirements Division has a Clinical Medical Research Branch which is primarily concerned with development of instruments, techniques, and criteria for more precise diagnosis and prognosis of disease states which may affect safety in flight. Significant progress has already been made in the field of diagnosis and prognosis of various forms of heart disease, using instruments and techniques developed specifically for the purpose of evaluating airmen. Methods of determining the effects of the aging process, especially with respect to the cardiovascular system, will be studied. The preliminary developmental work will be performed by this Branch.

THE Medical Standards Division coordinates the development of, and serves as the focal point within the Office of the Civil Air Surgeon for the issuance of appropriate standards, rules, and regulations dealing with mental and physical fitness, including the promulgation of approved regulatory material. This Division provides the medical substance for all rules prepared by the Agency, and reviews all regulations and procedural material in preparation by the Agency to insure proper medical substance. In establishing medical standards there are two identifiable types of activity: (1) evaluation of existing standards, (2) formulation and revision of standards.

The Accident Studies Branch of this Division investigates or supervises the investigation of medical aspects of civil aircraft accidents on behalf of FAA, and participates in such investigations as indicated under arrangements with CAB. Prior to the establishment of the Office of the Civil Air Surgeon, there was no such activity connected with civil aircraft accident investigations.



The advent of the jet age gave rise to a need for new medical standards for pilots.

The only direct indication of the absence of safety in flight is the occurrence of accidents or incidents which come close to being (*Continued on page 76*)

SPECIAL REPORT

HOW TO TRANSACT

A guide to the agency's various services—are you making the most of them?

ON THE GROUND or aloft, every airman has easy access to a wide range of FAA information, advice and services. From the check-out and licensing of the pilot or mechanic, every step of the way, the plane takes off because of the know-how that FAA must test and certify.

The weather and airways information before the flight; the word by radio en route; and the facts about airport conditions at destination all are working tools both of the professional pilot and the amateur wise enough to try to fly like a professional.

Check the items that follow . . . yours for the asking.

AIRMEN & AIRCRAFT RECORDS

Aeronautical ratings for airmen, and airworthiness certificates for aircraft, are under FAA's Bureau of Flight Standards. The Examination & Records Division (James V. Bernardo, Chief) has four branches: Aircraft & Airmen Records, Air Carrier Examination, General Aviation Examination, and Flight Engineer & Maintenance.

Plane owners and airmen will deal with FAA regional and district offices in the main. But for such purposes as registering aircraft titles and replacing lost certificates, direct correspondence is required with:

Aircraft & Airmen Records Branch,
Federal Aviation Agency,
Washington 25, D. C.

(This office is moving to Oklahoma City, Okla., about March 1. Some temporary delays in the handling of requests may be expected in this period.)

GET NEW RATINGS

For certified proficiency in aeronautical skills, FAA awards no less than 35 ratings, flight and ground.

Pilot Ratings are: Private Pilot (Airplane, Lighter-than-Air, Glider, Rotorcraft), Commercial Pilot (same 4 categories as for Private), Military competence ratings, Private and Commercial, Airline Transport Pilot, ATR—Helicopter, Free Balloon Pilot, and Instrument Pilot.

Other Flight Ratings include: Flight Instructor (Airplane, Glider, Instrument, Rotorcraft) and Flight Engineer, Flight Navigator, Flight Radio Operator.

Ground Ratings are: Ground Instructor (Aircraft, Aircraft Engine, Civil Air Regulations, Fundamentals, Link, Meteorology, Navigation, Radio Navigation), Airframe Mechanic, Powerplant Mechanic, Parachute Rigger (also by military competence), Aircraft Dispatcher and Air Traffic Control Tower Operator.

STUDY FOR EXAMS

The Examination branches issue the exams, held in FAA offices across the country. Other branches of the Bureau of Flight Standards give the flight checks.

Study guides, in preparation for exams, are available at

modest prices from:

Superintendent of Documents
Government Printing Office
Washington 25, D. C.

Here are some of the study guides that may be purchased, postage paid: Questions and Answers for Private Pilots, 25¢; Private Pilot Examination Guide, 75¢; Airframe and Powerplant Mechanics Examination Guide, 20¢; Instrument Pilot Examination Guide, 65¢; Instrument Flight Instructor Written Examination Guide, 10¢; Airplane Flight Instructor Examination Guide, 15¢; Written Examination Information for Aircraft Dispatcher, 20¢; Commercial Pilot Examination Guide, 75¢; Airline Transport Helicopter Pilot Examination Guide, 15¢; Air Traffic Control Tower Operators Examination Guide, 50¢.

FAA shapes its examinations to show not merely "book learning" but practical skill. Pilot exams test ability to plan and fly a specific cross-country trip, under stated conditions of wind and weather.

OTHER GOOD READING

A "List of FAA Publications" is available free from:

Federal Aviation Agency
Washington 25, D. C.

This includes many familiar texts from the old CAA, plus new FAA items, all in stock at the Government Printing Office.

For primary information, always good for refresher study in the fundamentals, three popular booklets are:

Few individual plane owners and pilots can well keep files of regulation changes, ordered and proposed. But files of regs are open in FAA district offices and summaries are in the trade press.

Keep current. Enforcement is likely to be more stringent rather than less so.

AIRCRAFT REGISTRATION

All changes in aircraft ownership, mortgages, airworthiness, and major overhauls and alterations are recorded by FAA. (See "Clear that Title," FLYING, 1959.)

Anyone buying a plane should check to be sure there are no hidden mortgages. Anyone lending should be sure the mortgage is recorded. Otherwise it might not pay off. Liens on engines also may be filed.

To check the file on an aircraft, it may be anticipated that the aircraft title companies in Washington will arrange for service in Oklahoma City when the office moves there in March.

LOST CERTIFICATES

If an aircraft registration or airworthiness certificate is lost, a new one may be requested. The fee is one dollar. Pay in advance.

For an airman's certificate, the fee is two dollars. Write full particulars to Aircraft & Airman Records Branch, Federal Aviation Agency, Oklahoma City, Okla. If you do this more than once, somebody is likely to be around to find out why. (Until March 1, write to Wash., D. C.)

By FLYING STAFF

BUSINESS WITH FAA

Facts of Flight, 50¢; Path of Flight, 65¢; and Realm of Flight, 75¢. They deal, respectively, with aircraft operation fundamentals, navigation, and weather.

An important addition is the Navy's "All-Weather Flight Manual," reprinted by FAA. This 300-page book is a big bargain at $3.50, from GPO. It covers in detail all required instruments and radio equipment, an analysis of radio maneuvers, attitude instrument flying, and much else.

Most important, for week-by-week flying, is the Airman's Guide, published bi-weekly, at $2.75 per year. This indispensable compendium includes airport conditions, new restricted areas, and a wealth of other current information, similar to the AAA guides to cross-country driving.

The same goes for the Flight Information Manual, at 60¢. Issued once or twice a year, it tells about air traffic aids and how to use them. A list of FAA district offices, complete with phone numbers, is included.

REGULATIONS

In the changes incident to FAA's assumption of the duties of the old Civil Aeronautics Administration, regulations are being reviewed. Some amendments are more restrictive, some less.

The tightening of medical rules is well known. On the more lenient side, the rules for airworthiness inspection of single-engine, fixed-wing aircraft have been relaxed.

REPORT ACCIDENTS

If you have an aircraft accident involving serious injury or damages over $100, you must report it by letter or phone to FAA or the Civil Aeronautics Board. A form will be furnished for a formal report. You are in violation if you fail to give the required information promptly.

GET WEATHER

The U. S. Weather Bureau is under the Commerce Department as CAA was. Replacement of CAA by the independent FAA changes nothing as far as the pilot is concerned, weather-wise.

Some 640 weather reporting stations are maintained for aviation by the Weather Bureau, FAA, and the Navy. They are divided into 12 circuits that bring in reports every hour on the hour.

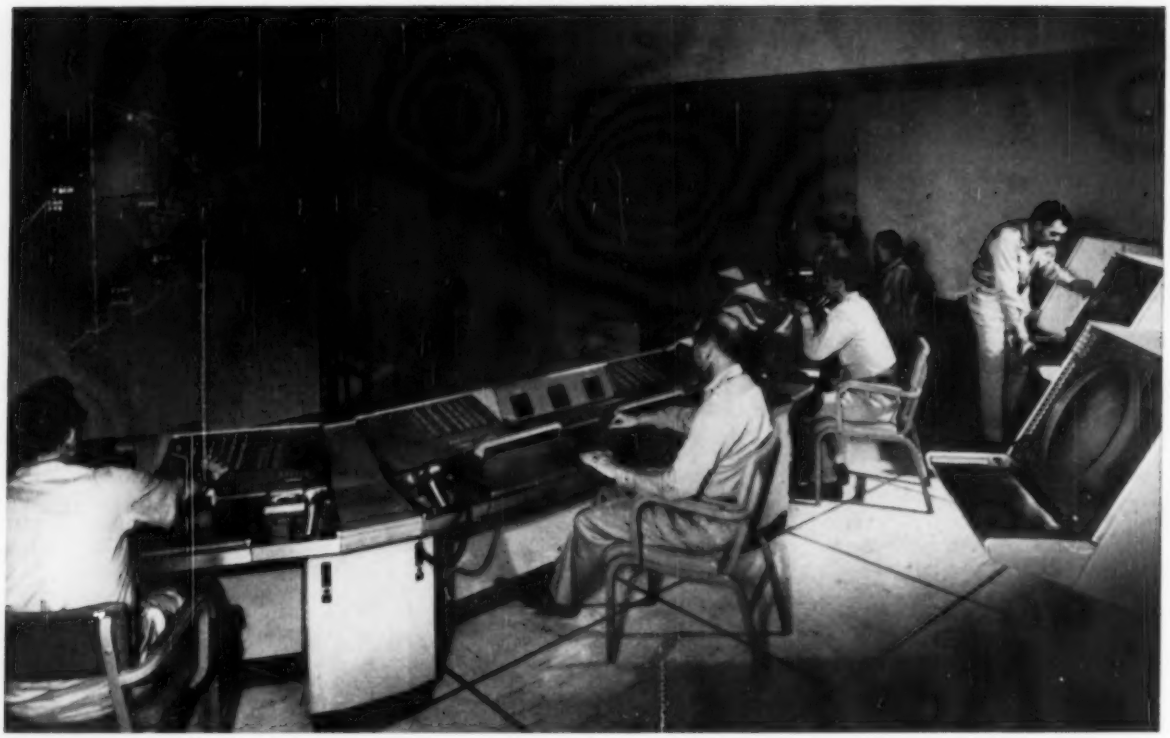
At 15 and 45 minutes after the hour, weather conditions for the stations in each circuit are reported. At 20 and 40 minutes past the hour, the circuits are open for special weather reports from aircraft in flight and other sources.

Another service is the transcribed weather reports on low-frequency radio, to run three to five minutes and repeat. These will be broadcast from 87 facilities. About half will be installed soon.

FILE FLIGHT PLAN

FAA urges that pilots flying (*Continued on page* 109)

SPECIAL REPORT



A SAGE Command Post. Air Force personnel can make immediate command decisions based on displays generated by the IBM computer.

AMERICA'S AIRSPACE

By KENDALL K. HOYT

AGAINST THE BOMBER attack that never comes, the General directs his air fleets from data on a screen, lit by the impulses of a great electronic brain. For instant facts, anywhere in the big picture, he points a light gun and the details flash before him.

Such is Project SAGE, the nearest thing to magic . . . and it had better be. It cost billions of dollars and is only a part of the network for air defense detection and control, all probably futile unless it finds some other use.

Civil flying has no such system yet. Control is still for hard-worked human brains, as traffic men sit in a bedlam of messages before rows of cardboard flight progress strips.

If bomber defense is outmoded by the missile threat, what is to become of SAGE and allied projects?

Write it all off as a multi-billion-dollar waste? Or use it to make peacetime aviation faster and safer?

As studies and restudies are made in Washington, the answer may well be to transfer SAGE from the Air Force to the Federal Aviation Agency, created a year ago for unified control of civil and military flights.

Thus, SAGE can meet an urgent civil need and yet serve whatever remaining defense value it may have.

SKYWARD TRAFFIC SNARL

Air traffic congestion over the main cities of the United States led Congress to set up FAA with power over the use of all airspace. Beyond the drastic enforcement of old rules, FAA is testing every possible new concept for control and new systems to back it.

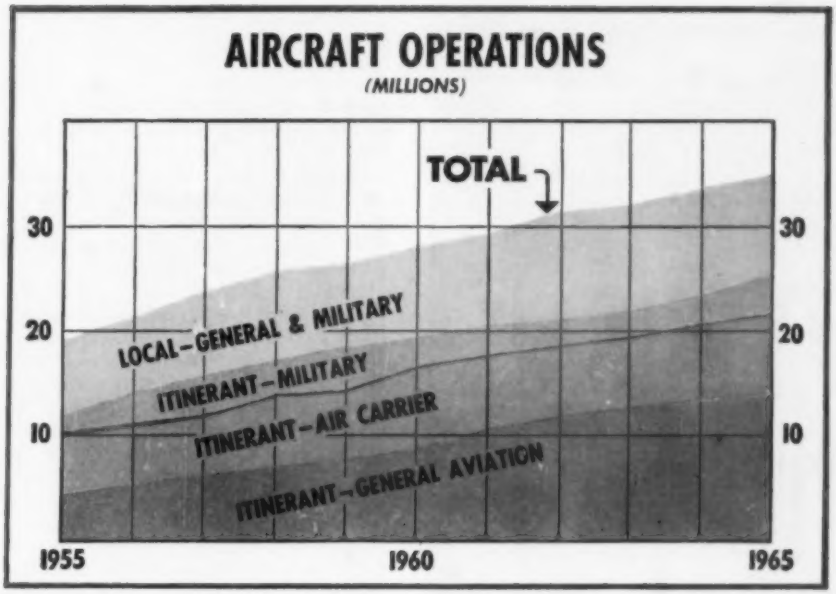
By 1965, civil and military operations will have doubled at airports with FAA control service, as compared with 1955. Two-thirds of the airline passengers now are from 22 hub terminals, where the sky is loaded.

Elsewhere, though millions of cubic miles of airspace are flyable over the nation, a jet airliner can cut through ten of those miles in a minute and overtake a slower plane, seconds after it is sighted.

From piston engines to turbo-props to jets, speeds outrun men's ability to make the split-second decisions between safety and disaster. Flight must be controlled to keep planes apart beyond any margin of error.

Even with cockpit radar and a panel full of instruments, the pilot needs the control men—the ones with the cardboard strips and the tower operators who watch the blips of light on the surveillance scopes.

The control men in turn need something more than human brains for lightning calculation of all the complex



FAA estimates (in millions) of aircraft movements at airports with FAA traffic control service for the fiscal years 1955-65. Note that the traffic doubles during this decade.

MUDDLE

As civil air traffic becomes snarled beyond human direction, a writer says it's time to use SAGE, the great electronic brains of air defense, developed at a cost of billions of dollars for a war plan fast becoming obsolete.

factors that go into flight. That is what SAGE can do, unless the billions that went into it are lost, indeed.

HODGE-PODGE OF SYSTEMS

Air traffic control would be hard enough if all planes and fields were equipped for any one system. After the fast changes since World War II, several systems overlap each other.

The old fixed beams go from low-frequency stations in four directions. If a pilot hears "bee-beep" in his earphones, he is on one side of the beam. If he hears "beep-bee," he is on the other. But he does not know just where.

Planes may avoid collision by flying at different altitudes, though altimeters may be wrong by hundreds of feet. In hazy weather, the old way was for planes to stack ten deep over an airport and let down slowly, one by one.

For horizontal separation, as well as vertical, VOR-DME was developed after the war. VOR (Very-high-frequency Omni-Range) sends in all directions. The bearing from plane to station shows on a cockpit dial.

DME (Distance Measuring Equipment) shows the distance from the station, so the pilot knows his position. With a course computer added, he can fly a straight line in any direction he chooses.

Just as airlines and airfields began to install the expensive flight and ground equipment, it was learned that the armed forces secretly had developed TACAN for Tactical Air Navigation, to show course and distance on one instrument.

Officials decided, as they might better have done beforehand, that a single system was needed. After a great uproar, features of VOR and TACAN were combined in VORTAC.

There is still no working "common system." TACAN is far from universal. Some military planes use ultra high frequency. While the 2,000 airline planes must meet high standards, many of the 70,000 other civil aircraft of the country have no radios at all.

To keep the planes apart on the main airways, FAA operates some 30 traffic control centers where the men with the cardboard flight progress strips do their best.

Electronic computers, to leave less to human error, are installed in only six of these centers. Though hundreds of millions have been spent, the work of equipping the airways for all-weather flying has but begun.

UNUSED MILITARY SYSTEMS

The armed forces meanwhile (*Continued on page* 104)

Sperry's new automatic pilot for Army Aviation presents ideal possibilities for use in civilian light aircraft.

By VICTOR LEVI
Project Engineer, Avionics Division
U. S. Army Signal Research and Development Laboratory
Fort Monmouth, N. J.

UNIVERSAL AUTOPILOT

THE U. S. ARMY Signal Research and Development Laboratory at Fort Monmouth, N. J., has been engaged in a program that promises to have far-reaching effects on civilian as well as military aviation. The development portions of this program, being performed by the Sperry Phoenix Company, Phoenix, Ariz., are at a stage where the results are of special interest to readers of FLYING.

The "Automatic Flight Control System (AFCS)," AN/ASW-12(V), now under development, is considerably more than an ordinary automatic pilot. It embodies concepts and designs which may revolutionize this field. It is of particular significance in that it promises to be sufficiently reliable, flexible and low in cost to make it practical for use in virtually every light aircraft.

Previously built automatic pilot systems have been developed for and generally used in a single aircraft or group of closely related types. The secret behind this new system is that it is designed for "universal" application; that is, it is intended for use in all Army fixed wing, rotary wing (helicopter) and drone aircraft. By strict adherence to component standardization and by design for mass production, it is expected to overcome serious difficulties which have existed for many years in the automatic pilot field.

By designing this system for universal use, many important benefits are anticipated. Universality will enable this automatic pilot to be produced in much larger quantities than would be possible with conventional equipment designed for a single aircraft type. Since most component parts will be identical over a wide range of aircraft types, repair parts and logistic problems, in general, will be considerably simplified. Repair and maintenance facilities as well as personnel training will also be similarly improved by use of a single system.

The automatic pilot discussed here is well beyond the early planning stages. Presently it is performing in prototype models of the S-55 Sikorsky Helicopter, Military H-21 Helicopter (Vertol Model 44) and Beech L-23 aircraft (Twin Bonanza). Preparations are being made to install this system in the Army's new fixed-wing Grumman Mohawk turboprop aircraft and it is intended for use in the Vertol "Chinook" turbine helicopter. To this list of piloted aircraft may be added the Army's SD-2 Drone, in which the basic AFCS system configuration is also to be used.

The AFCS has been designed for a wide range of application by using a standard grouping of component elements, each of which is a self-contained functional unit tailored to do a particular job. An automatic pilot for a particular aircraft type is assembled, using those elements as are necessary. Actually, in most Army aircraft, it is planned to use a standard three-axis grouping which will control the pitch, roll and yaw axes of fixed wing aircraft, and a five-axis grouping which will control pitch, roll, yaw, engine rpm and collective (motion in the vertical) axis for helicopters. This building block concept promises a remarkable flexibility combined with a high degree of sophistication. It will allow automatic pilots to be synthesized, containing only those functions or axes of control needed for the particular airplane type.

The heart of this new system is the "Electro-Mechanical Rotary Actuator." This is the unit which is mechanically coupled to the airplane control surfaces to control the aircraft flight. It is, in reality, a complete servo-control device with self-contained power amplifier. A plug-in computer element is used with each actuator to tailor it to the particular job it is to do. This computer element electrically "shapes" the control signals applied to the actuator and insures that they are of required magnitude and timing for the function being performed. Identical actuators may thus be used to perform a variety of control functions, in diverse aircraft types, provided appropriate computer elements are assigned to each function.

The complete automatic pilot contains a group of actuators, one for each axis of control, i.e., pitch, roll, etc. The system can provide an increased or decreased degree of

Army's high performance observation plane, the Grumman AO-1 Mohawk will use the standard three-axis Sperry automatic flight control.

The five-axis grouping which controls pitch, roll, yaw, engine rpm and collective will be installed in the military H-21 Vertol helicopter.

automation by the addition or subtraction of appropriate actuator elements. Sensory devices, such as gyroscopes and barometric altitude controls are utilized in the system to provide advanced capabilities and sophisticated operation. One of these, the "Automatic Navigation Coupler," provides automatic navigation operation by coupling to equipments such as VOR, ILS, Radar Altimeter, Doppler Navigator, etc. One other, the "Attitude Reference Control," is an element which insures smooth, disturbance-free engagement of the system while in flight.

The flexibility of the AFCS can be readily visualized from the following examples of its adaptability to a wide range of aircraft types. The helicopter automatic pilot uses five actuators providing five-axis control: pitch, roll, yaw, collective and rpm. It is designed to control the larger helicopter aircraft in use by the Army. As such, it is one of the most complex AFCS configurations, and is expected to equal or better the performance of all other helicopter automatic pilots available today.

ON THE other end of the scale is the two-axis system, suitable for the very light aircraft as exemplified by the Army Cessna L-19A. It has all the unnecessary elements removed from it and controls just the pitch and yaw axes. (Heading control may be introduced by addition of the directional gyro.) This two-axis autopilot weighs less than 20 pounds compared to a five-axis system weighing less than 60 pounds. Inasmuch as the elements are identical to those in the five-axis system, true universality has been achieved. In fact, axis by axis, any number of different automatic pilot systems suitable for a wide variety of applications can be erected from the standard set of elements mentioned.

Extremely small volume requirement, low system weight coupled with low power consumption have been achieved by the use of the most modern circuitry components and techniques. Vacuum tubes formerly used in similar systems have been eliminated. Silicon diode and transistor semiconductors and the latest circuitry components have combined to substantially increase operating efficiency, which has considerably decreased power consumption and heat dissipation of the system elements. The system construction has been facilitated by the use of the most modern printed circuit card elements for each circuit function; a technique which promises low production costs as well as simplified maintenance. These circuitry techniques promise to result in a substantial improvement in system reliability since many of the least reliable circuit elements, such as vacuum tubes, have been discarded.

THE AFCS System which has been described is being developed to fly in a wide variety of light surveillance, troop transport and liaison vehicles which comprise the Army's aviation group. As such it is designed to meet the stringent requirements necessary for all militarized equipment. Certain phases of Civilian aviation and Army aviation have a great deal in common however; the types of aircraft which each group uses are similar and in many cases identical. Therefore, this new Army automatic pilot represents ideal possibilities for extension into the civilian light plane field. END

The philosophy of this unique system has a practical application in the civilian aviation field, especially for single engine aircraft and light twins. After several years of intensive survey, market analysis and discussions with airframe manufacturers, airport operators, private and executive pilots, the Sperry Phoenix Co. has developed the SP-3 family automatic flight control system for the civilian market. Though based on the same modular "building block" principle as the Army's Universal Auto Pilot, the SP-3 differs from it by virtue of having been designed to accomplish a less sophisticated mission. It will become available in early 1960 and fully described in a forthcoming issue of FLYING. THE EDITORS

Weighing under 20 pounds, the less sophisticated two-axis system of AFCS will be installed in light aircraft such as this Army Cessna L-19A.

THE AIRMAN'S WORLD

From their windowed towers overlooking
the complex of field and facility, the harbor
masters of the great ports of the air ocean
marshal in orderly procession the vessels
launching to the ends of the earth or making
landfall from the four winds.

Into the purview of these arbiters
of the airways come the flags of the nations,
the tongues of the races, the hurryings of
the captains of commerce all acquiescent to
the voices which loop from the tower
to impose upon the traffic.

New York International Airport. Photograph by The Port of New York Authority.

Here in the pattern of control where
the crews from the creeds and breeds of the
climes wheel their planes, the golden rule
is the first law of survival, and obedience
to a spiritual concept is a principle
of profit in the market place.

The old pilot ponders that each successive
revelation of natural law and science seems to
drive man more closely into the arms of man
and that in the ultimate man will have found
the answer to all things when he answers his
first question . . . "Am I my brother's keeper?"

THE PRO'S NEST

A timely discussion of winter flying's worst enemy and some operational practices which will prove helpful in combating it.

THE HAZARDS OF ICE

By TED DUROSKO

DURING THE WINTER months, especially under IFR conditions, a pilot is very likely to encounter weather situations conducive to the forming of ice on the aircraft while in flight. The ice seemingly appears from nowhere and begins to grow in ragged layers on the leading edges of the wings and tail surfaces, or spreads out in a smooth, tailored fit over parts of the airframe.

As the ice forms on the wings, it changes the shape of the airfoil thereby decreasing their lifting capacity and increasing the stalling speed. The change of airfoil shape also causes higher drag, calling for more power to keep the aircraft flying at the same speed.

The amount of engine power available also can be affected by this airborne menace. So tenacious is the ice that it can form and adhere to the whirling propeller, lower its airfoil efficiency and unbalance the blades, resulting in severe engine vibration. Power availability can be further complicated by ice forming in the intake ducts and restricting the air flow to the engine. Likewise ice can form in the carburetor throat and reduce the amount of fuel/air mixture to the cylinders.

Under what conditions does ice form on the surface of an aircraft? Generally this occurs when the air temperature at flight level is between 32 and 20 degrees F., and the aircraft is flying through visible moisture such as clouds, rain, drizzle or wet snow. It is a fallacy, though, to assume that icing of major concern cannot occur at temperatures lower than 20 degrees F. Pilots occasionally have reported severe encounters with ice at temperatures near 0 degrees F. Ice is formed at these low temperatures when water droplets suspended in the air, even though cooled to well below freezing, remain in liquid state until disturbed. When this does happen, they freeze immediately on contact with the moving aircraft and form rime, clear, or a mixture of both ice formations.

• Clear Ice—This type of ice is a transparent or translucent coating which has a glassy appearance. It may be compared with the glaze type of ice which encrusts trees and other objects when rain falls during freezing weather. It adheres very firmly to the surfaces of the aircraft.

This ice does not alter, to any great extent, the shape of the surface over which it forms, but it does add to the weight of the aircraft. Because of added weight and some decrease in lift, the plane will stall at higher speeds.

Clear ice occurs in clouds of the stratocumulus and cumulus types when the temperature is slightly below freezing, and in regions of freezing rain where air temperatures are between 32 and 24 degrees F.

• Rime Ice—Identified by a white or milky appearance, rime ice appears as rough shapes of granular deposits which accumulate on the leading edges of wings, tail surfaces, antenna posts, vents, rivet heads and other projections. The interior of rime ice is frequently composed of very tiny opaque ice pellets or grains sometimes combined with a light, feathery ice crystal structure.

Rime ice tends to build forward into the air stream as a blunt, irregular surface. If icing is moderate or severe, the irregular shape formation destroys the air flow pattern around the wing surfaces as well as adding considerably to the drag, causing the plane to stall at much higher speeds than normally.

In weight, rime ice is somewhat lighter than clear ice since it is non-crystalline and more or less porous. Icing of the rime type is usually found in all clouds where temperatures are below 25 degrees F., and in freezing rain when temperatures are excessively low.

When encountering icing conditions, a pilot will discover that there is no precise temperature figure at which clear ice ceases and rime ice begins. Most likely he will find a broad zone in the middle and low 20's (F.) during which (*Continued on page* 90)

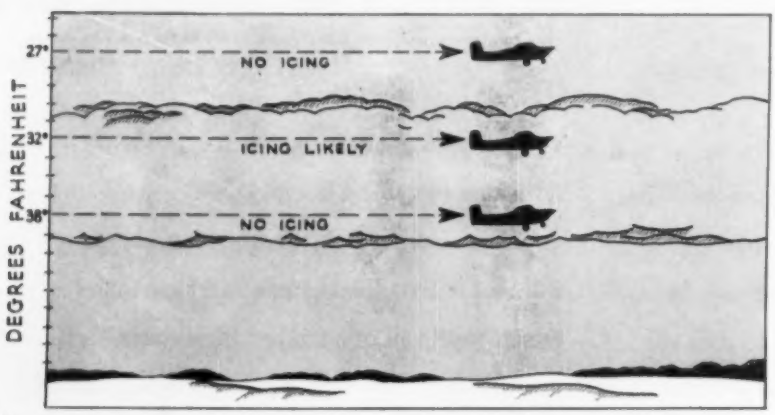


FIG. 1.

When an aircraft without deicing equipment encounters external ice, another altitude where icing conditions are less likely to exist should be requested. If VFR, a let-down to a warmer level or a climb to a colder one should be made.

I'VE NEVER HEARD THE WIND

The lament of a jet fighter pilot.

By 2/Lt. RICHARD D. BACH, USAF

OPEN COCKPITS, flying boots and goggles are gone. Stylized cabins, air conditioners and sunshaded windshields are here. The King is dead! Long live the King! I had read and heard this thought for a long time, but all of a sudden it sank in with a finality that was disturbing. We have to admit to the increased comfort and all-weather abilities of modern lightplanes, but are these the only criteria for flying enjoyment?

Enjoyment is the sole reason many of us started to fly; we wanted to sample the stimulation of flight. Perhaps in the back of our minds, as we pushed the high-winged cabin into the sky, we thought, "This isn't like I hoped it would be but, if it's flying, I guess it will have to do."

A closed cabin keeps out rain and lets one smoke a cigarette in unruffled ease. This is a real advantage for IFR conditions and chain smokers. But is it flying? By the fact that one is moving through the air on wings, it is. But that shouldn't constitute flying.

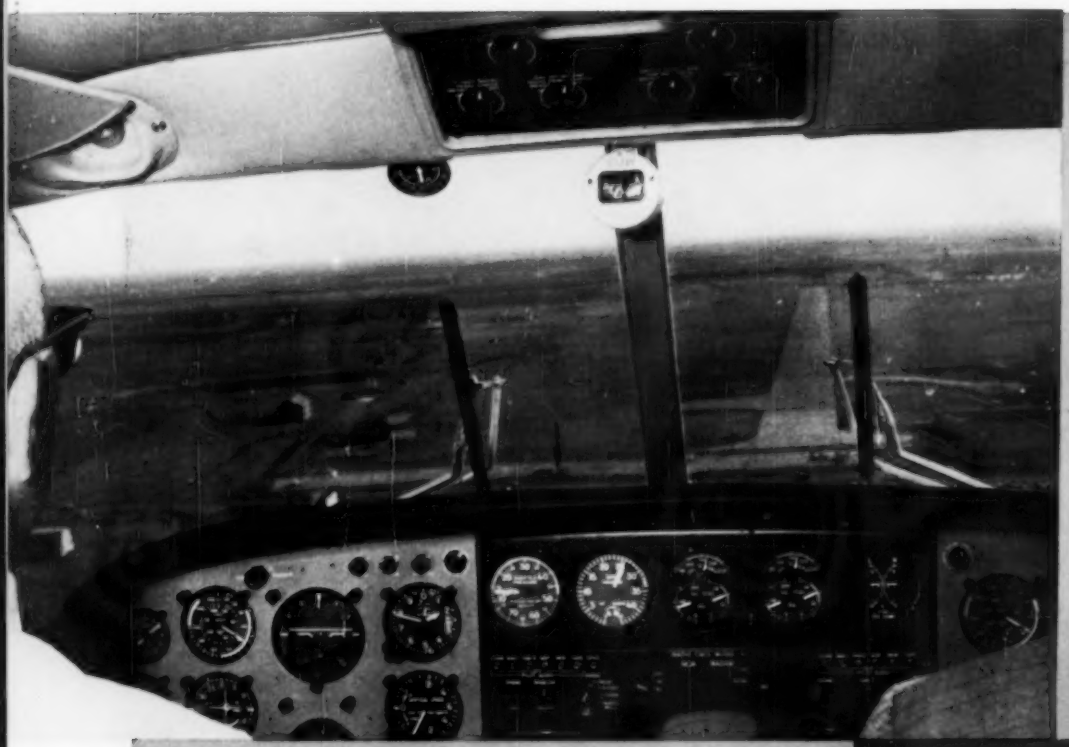
Flying is the wind, the turbulence, the smell of exhaust and the roar of an engine; it's wet cloud on your cheek and sweat under your helmet. It can't be just dully moving through the air.

I've never flown in an open cockpit airplane. I've never heard the wind in the wires, or had only a safety belt between me and the ground. I've read, though, and know that's how it once was.

Are we doomed by progress to be a colorless group who take a roomful of instruments from point A to point B by air? Must we get our thrill of flying by telling how we had the needles centered all the way down that ILS final? Must the joy of being off the ground come by hitting those checkpoints plus or minus 15 seconds every time? Perhaps not. Of course, the ILSs and the checkpoints have an important place, but don't the seat of the pants and the wind in the wires have their place too?

There are old-timers with frayed logbooks that stop at 10,000 hours. They can close their eyes and be back in the Jenny with the slipstream drumming on the fuselage fabric: the exhilaration of the wind-rush through a hammerhead stall is there anytime they call it up. They've experienced it.

It isn't there for me. I started to fly in a Luscombe 8E in 1955, no open cockpits or wires for us new pilots. It was loud and enclosed, but it was above the traffic on the highways. I thought I was flying. (*Continued on page* 106)



CHECK PILOT REPORT:

Beechcraft Model 65 Queen Air

Built to meet the specific demands of businessmen, a truly deluxe executive transport makes its debut.

By NORMAN JACOBSHAGEN

Top of page: Excellent cockpit visibility is apparent on final approach at Beech Airport. Right: Author uses built-in folding table in the cabin on which to take notes about the Model 65 as explained by Marvin Small, Manager of Model 65 sales.

QUEEN AIR

Newest member of the Beech family . . . the Model 65, or as they've named it, the Queen Air.

IT'S A SWEET AIRPLANE! You may come up with different words, but the odds are 1,000 to one that the exclamation will have the same meaning after you've seen and flown Beech's new Model 65 or, as they've named it, the Queen Air. Whether you're a pilot or passenger, nothing seems to have been overlooked in comfort, ease of flying or safety. It is, in truth, an executive transport, junior size, with all the conveniences one would expect to find in a full size one.

With the twin-engined Travelair, Model 50 Twin Bonanza, and famous Model 18 well established in the Beech line, it seemed a bit odd to bring out this new airplane which doesn't quite fit into any present day category. "What was the design and sales philosophy behind the Model 65?", I wondered. This was my first question when I met Jerry Gordon, Chief of Preliminary Design and Aerodynamics, for a briefing on the new airplane.

"We had expected," Jerry explained, "that the Model 50 would be an owner-flown airplane. As it turned out, we were 95 per cent wrong. Only about five per cent of the owners flew their own airplanes. The rest used professional pilots. Pretty soon complaints began to come back to the factory. Not of the airplane," he hastened to explain, "the owners wanted certain things." This resulted in a thorough survey of owners, prospects who failed to buy the Twin Bonanza, and operators.

"It became apparent that this class of aircraft buyer wanted certain features: a separate pilot compartment that could be completely closed off, individual reclining chairs, even better visibility, easy entrance that did not require climbing up on the wing, a baggage compartment accessible in flight, a snack bar and toilet facilities."

Jerry grinned. "That's quite an order. Naturally we started with the Model 50 fuselage. We cut, widened, spliced and tried every available idea, on paper. But it soon became apparent that a completely new fuselage was needed. Well, we've given them everything they wanted. And with an even greater gross load, the new ship can equal or exceed the Model 50 performance on the same horsepower. It's quite a package."

Leddy Greever, Vice President, Commercial Sales, must also believe the Queen Air is quite a package. "We'll sell $150,000,000 of the Model 65 in the next ten years," he says.

After this desk-side briefing, Marvin Small, Manager of Model 65 sales, took me in tow for a look and flight in the real article. In all honesty I must report that the first picture I had seen of the Queen Air was disappointing. It had looked almost "slab sided"—too tall for its length. But the first time you view the Queen "in person" the effect is entirely different. It's impressive.

Starting outside the airplane, Marvin pointed out some of the design features that had allowed them to arrive at higher gross and better performance with no more horse-

A look forward from entrance shows four comfortable reclining chairs. A fifth seat may be added, still leaving lots of leg room for everybody.

power than the Model 50. New squared-off wing tips, the raised tail, newly designed wing fillets, a flatter windshield, a nose wheel door that is fully closed in flight, lengthening of the engine nacelle over the wing. As Gordon had explained, "There are no real major innovations. It was a matter of painstaking care to pick up a little here and a little there till we had the performance we were after." Also the airplane sits flat instead of the three-degree ground angle of the Model 50. This seemingly minor change has made a little difference in the take-off and a really big difference in shorter landing distances. The 65 will actually land shorter at greater weights than the 50.

Walking to the entrance, located behind the wing, Small turned the handle, reached from ground level, and opened the door. It's hinged at the bottom and, when lowered, contains steps for easy entrance to the cabin section. A warning light on the instrument panel lights up when the door is not closed and locked.

I had been told that N11OQ was a test airplane. But she had been rehabilitated to production-like plushness and the whole effect was one of tasteful elegance in upholstery, headlining and trim. To the right, as you enter, is the baggage area with a "light baggage" shelf for hats, cameras, brief cases and all the other impediments that people bring on a trip. The toilet is also located in this area with screen for proper privacy.

The bulkhead separating the cabin from the baggage area can be moved rearward to make room for a fifth chair if desired. In this particular plane, a snack bar was located just forward of the bulkhead. No passenger or crew in this airplane need go hungry or thirsty during a long flight when this handy accessory is properly stocked.

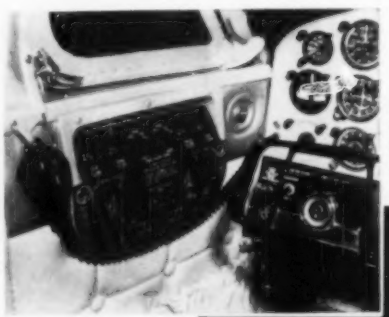
N11OQ's cabin has four seats. They are fully reclining, just like their big brothers on the airlines. These seats were arranged with two facing forward and two rearward. If this should be unacceptable the passengers can lift them off the rails (which run almost the full length of the cabin), turn them, reinsert, and adjust forward or backward for proper knee room in little more time than it takes to tell.

Above each seat there is a spotlight for individual reading, and a more diffused light for general illumination. Both can be controlled from the pilot's cockpit if necessary. Here, too, is located an air vent so that each passenger can regulate ventilation to suit his personal comfort. On the left side of the cabin is a built-in, foldaway table.

Three extra large windows line each side of the cabin for true "Vista Vision." A 100,000 BTU gas combustion heater with four well-placed outlets in the cabin section should give excellent warm air distribution. Temperature can be passenger-controlled by a thermostat located in the cabin, or by the pilot. Should the pilot need unusual heat for demisting or deicing the windshield, he can override the cabin control and direct the entire heat output to the windshield. Unseen, but just as important as all the visible plushness, are the three-inch thick walls packed with fiberglass and double pane windows.

As nice as everything has been up to this point, it's the cockpit that will make the pilot start drooling. Even before there is a chance to check all the features, you have a feeling that this is one front office that's going to be just right. First off are the sliding doors that separate the cockpit from the cabin. The seats are models of comfort. They adjust up and down as well as fore and aft. And the aisle-side arm rest lifts out of the way for easy in and out. On the left side panel are gas tank valves, fuel gauges, and switches for the fuel booster pumps. The whole thing is laid out like the Model 50 with schematic lines so that you can tell at a glance from which tanks you're drawing, how to switch for cross tank feeding, etc.

For such complete instrumentation, there is little of that "first look confusion" that so often goes with a strange panel. Everything seems grouped (*Continued on page* 82)



Below: Steps are built right in the door which is hinged at the bottom. Jerry Gordon, Marvin Small and author about to board the Queen Air. Inset: Fuel control panel is at pilot's left.

GHOSTS IN THE COCKPIT

A unique course on the psychology of pilot survival helps to exorcise some of the specters that lurk in the sky.

By WILLIAM PETER BLATTY

A DISTURBINGLY LARGE number of pilot errors," according to a California psychologist, "are caused by hallucination, mirage or illusion." And this psychologist should know! Head of the Department of Psychology at the University of Southern California, Dr. Neil Warren also teaches a unique course on the psychology of pilot survival for SC's School of Aviation Safety, the only one of its kind in the world.

For the private and businessman flyer, the school conducts a specially designed eight-week course that deals with subjects not usually included in ground schools operated under FAA requirements, concentrating instead on factors that will contribute to the reduction of flying hazards. Main attractions of the course are a fully operational human centrifuge and Mirage Expert Warren.

Where the centrifuge tests G-tolerances, Warren deals with the apparently ubiquitous specters that haunt the cockpit: autokinesis, inner ear illusion, false horizons and "lean." None of these items is on the side of good.

"Autokinesis," explains Warren, "is an illusion that can be very easily demonstrated if you will stare constantly at a small, fixed light in an otherwise dark room. You will notice, in approximately ten seconds, that the light appears to move." Applied to aviation, when a pilot stares at a fixed light on a dark night, he may believe that the light moves or peels off when actually the light remained stationary.

It wasn't too long ago that a private pilot—let's call him Joy—dramatically demonstrated that autokinesis is more than a parlor trick. Arriving at an airport in New York, he became tense while observing that the weather there was foul. During the 45 minutes that Joy waited for take-off, the fog was boiling so turbulently that visibility fluctuated up and down between zero and one and one-half miles. On the runway, finally, he was delayed another ten minutes for clearance. While he waited, Joy decided he would have to open his cockpit window in order to see the runway lights while taking off. It was a near-fatal maneuver. During the run, he leaned slightly to the left to see through the side window, fixing his gaze on the runway lights. Autokinesis set in. The row of lights appeared to move left and away as he went down the runway, and to compensate for the imagined deviation, he turned his ship to the left. At the end of his roll, *75 feet to the left of course*, the aircraft crashed and burst into flames. Joy, who survived, recounted later that he thought he was turning *right!*

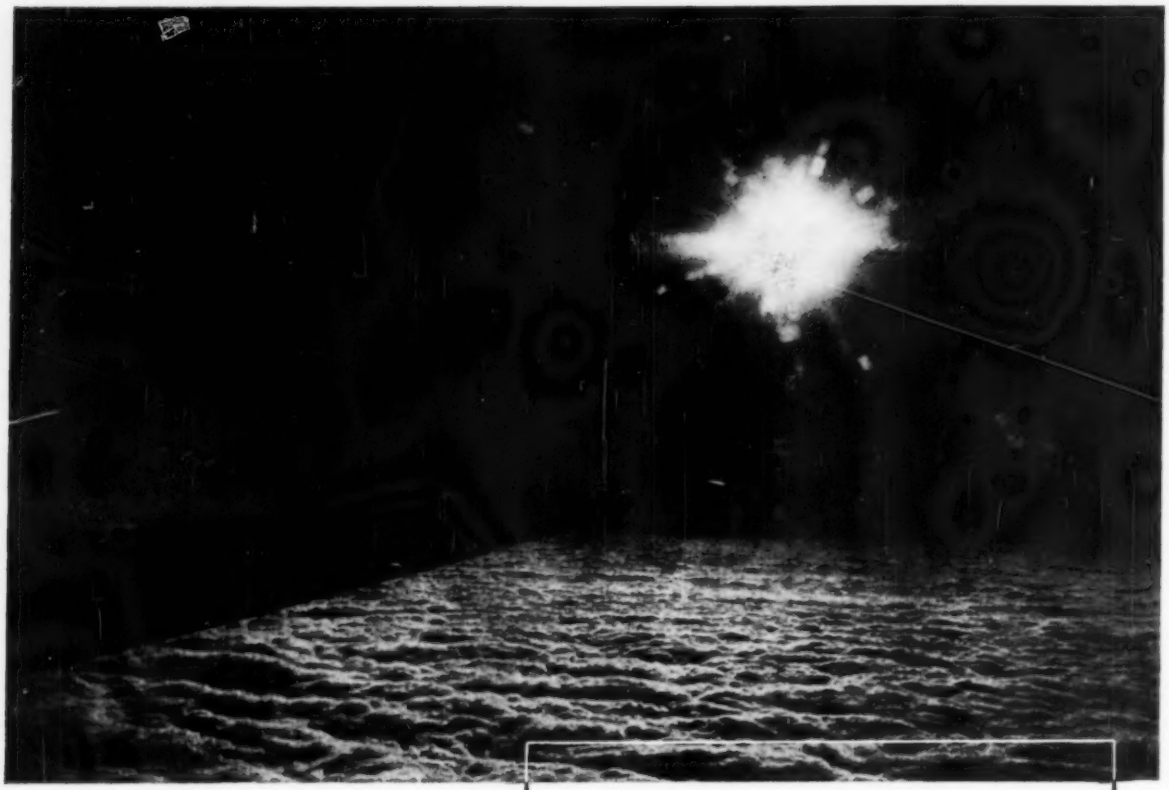
What sets the stage for autokinesis? According to Dr. Warren, simple eye muscle fatigue.

In addition to autokinesis, there is also some spooky business going on with regard to "leans," says the aviation psychologist. "During instrument flying," he explains, "if attention is not focused on the instruments and if the plane should roll suddenly to the left and then recover very slowly, the pilot will feel that the plane is still banked to the left when actually it is straight and level." This illusion, he continues, results from an inadequacy of the "inner ear" sense: the inner apparatus of the ear has a threshold for tilt and pitch and movements under this threshold are not perceived.

As dangerous as the lean is the "Graveyard Spin." "Rotary motion which is discontinued," says Warren, "gives the sensation of rotation in the opposite direction. Thus, the pilot who does not have a good visual reference on recovery from a spin to the left feels the false sensation of spinning in the opposite direction and attempts to correct this, causing the plane to go back into the original spin." Probably everyone has experienced the same sensation in childhood, when spinning around very rapidly in an attempt to become dizzy. On cessation of the spin, the world would appear to be moving in the opposite direction. Avoid wanton spinning of this sort like the plague, urges Warren.

The occasional danger that lurks in the skies also takes the shape of "false horizons." In flying with no reference to the actual horizon, cloud banks, as most pilots know, are often misinterpreted as being horizontal, and this false impression can be strong enough to force the pilot to change the attitude of his plane.

Indeed, so many of these illu- (*Continued on page* 110)



FAITH

Through the fog around us there was still no sign of a runway. In the next second or two we would land safely—or crash!

By JAMES H. WINCHESTER

NOT SO LONG AGO, in weather like the inside of a milk bottle, I was aboard an Air Force transport approaching Shemya. Now Shemya is a flat, treeless, fog-bound, volcanic island, five miles long and three miles wide, at the extreme tip of the Aleutian Island chain. It is almost the midway point between the Alaskan mainland and Tokyo, the key to the Great Circle air route between the United States and the Far East.

As a midway refueling stop on the Great Circle route, Shemya is geographically ideal. Climatically, it is far short of adequacy. The usual weather there is so bad that landings and take-offs would not be permitted under the ordinary standards of air safety. The Federal Aviation Agency sets a 500-foot ceiling and a mile of forward visibility for the operation of commercial airliners. On Shemya, planes come in and out with less than 100-foot ceilings and visibility of less than an eighth of a mile. They accomplish this through that old standby Ground Control Approach, whereby an operator on the ground plots a plane's position in the air and literally talks the pilot safely down to the runway.

Now, this bleak, fog-shrouded afternoon, I was getting a firsthand show of how this mutual trust—or faith, if you want to call it that—works between these men on the ground and the pilots in the air.

Eight hours before, in the misty Arctic dawn, I had taken off from Elmendorf Field at Anchorage. For most of those eight hours we had been in a blanketing fog so thick that we could not even see the tips of our own wings from the cockpit.

Fifty miles northwest of Shemya we dropped to 3,000 feet and we were still smothered in fog. The Shemya control tower switched us over to GCA. Through the headphones clamped over my ears, I could hear every word spoken between the pilot at my elbow and the GCA operator on the ground. GCA had us plotted on their radar.

"Air Force Four Two Four. This is Shemya GCA. How do you read GCA? Over."

Our pilot acknowledged the reception, and the GCA operator began his instructions. Outside the cockpit windows, the fog seemed to thicken as we dropped toward the unseen runway below. We had to hit it on the nose; if we missed, we could survive for less than a minute in the frigid waters of the Bering Sea. (*Continued on page* 106)

The Cessna 170-B offers good cross-country performance with its 120-mph cruise, four-hour fuel range and easy-to-fly characteristics.

USED AIRCRAFT CHECK PILOT REPORT:

CESSNA 170-B

Still a favorite with many pilots, this model is economical to operate and easy to fly.

By TOM DENNY

CLIMBING INTO the all-metal, four-place Cessna 170-B to refresh my view of the airplane for this report was rather a nostalgic occasion because, like a large number of other pilots, I have enjoyed many hours of trouble-free cross-country flying in the 170-B with its 120-mile cruise speed, its normal four-hour fuel range, and the fairly comfortable, adjustable seats.

The B model, which appeared in 1952, was Cessna's first civilian model to be equipped with the large Para-Flaps which contribute to shorter take-off and landing distances than its predecessor, the A model. Cabin soundproofing was more effective and, in addition, there were two inches of added headroom in the rear. The complete rear seat assembly can be removed by unfastening five bolts and, with the rear seat out, some 50 cubic feet of cargo space becomes available.

According to factory production figures as given to me by Northeastern Ohio Cessna distributor Bill McNeely, 3,724 170-Bs were manufactured during the years from 1952 to 1956. This compares to 1,536 of the A models which were produced from 1949 through 1951.

Resting on its simplified spring steel landing gear in a three-point attitude, the 170-B design offers good forward and side visibility. The downward-slanted nose cowl allows the pilot to see well enough ahead to eliminate stagger-taxi. Both front seats slide fore and aft on tracks and allow a setting which is the best compromise between forward visibility and comfort.

Controls and switches are within easy reach of the pilot. Between the two front seats are located the trim control, flap handle, and fuel selector valve. In the 170-B, the fuel system consists of two gravity-feed, 21-gallon tanks, one in each wing. Both tanks are connected to the engine through a rotary-type fuel selector valve which has four positions labeled "Both Off," "Left Tank," "Right Tank," and "Both On." Fuel quantity indicators are the float type, mounted in each tank at the wing root inside the cabin. A note of caution at this point. The 170-B fuel selector valve has its pointer in the handle. This means that the handle must be pointed to the position desired. In other makes of aircraft, the pointer is usually at the opposite end of the selector handle and, unless a pilot keeps this in mind, he might find himself in an embarrassing situation.

Instrument panel of privately-owned, 1953 170-B which is big enough to accommodate several radios and extra instruments.

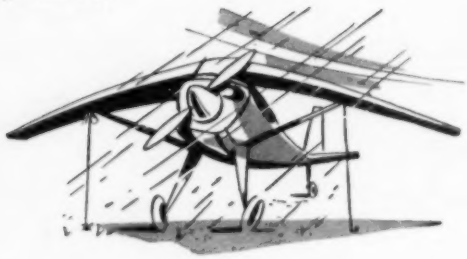
Starting the six-cylinder, 145 hp Continental Model O-300-A engine follows the standard practice for lightplanes. It usually catches on without any difficulty, and after releasing the parking brake, the 170-B rolls easily with little power. Control is good on the ground and normal maneuvering can be accomplished with the steerable tail wheel. For tight or sharp turns, or for control in gusty wind, the hydraulic brakes are effective.

With the streamlined engine cowling (*Continued on page 102*)

Here are some helpful hints on how to send your airplane to the junkyard with very little effort.

By CHUCK BANFE

"Don't worry about tie-down even if it is going to rain. Tie the ropes as tight as you can . . ."



24 POPULAR WAYS

ARE you keeping up with that guy Jones in the big hangar? If your plane is in pretty good shape, you probably aren't. You're not in the swing until you have learned to ruin your aircraft like he and so many others seem to do.

Jones and thousands of other aircraft owners have discovered the *easy* way to send their planes to the junk yard or end up in a heap on some lonely mountainside. It doesn't take a lot of doing; no work at all, and very little money spent. Any aircraft owner can learn how by just following a few simple-minded rules:

1. *Don't trust the mechanic.* He only fixes them for a living. Get your advice from someone who really knows, like a close friend who is a stamp collector or a barber.

2. *Don't pay attention to overhaul time if the engine performs within limits.* At least, postpone the job as long as possible. Delay will insure maximum engine wear and make the next overhaul seem even farther away. (Of course, engine failures increase arithmetically with engine time, and then the curve sweeps upward geometrically after engine overhaul time has been exceeded. But then, what do we practice forced landings for anyway?)

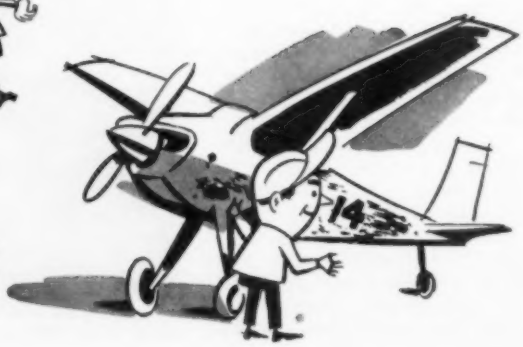
By now you should be starting to see the light. And now you are catching on to the rules. As you can see, it's pretty easy and the beauty of it is that learning comes from what you *don't* do! What you don't spend! But we're just beginning.

Old-but-not-so-bold pilots have found that there are 24 highly popular, sure-fire ways to ruin your aircraft, or trip that next-of-kin switch with almost no effort at all. You've seen the first two; now let's have a look-see at the rest of them.

3. *Don't spend much money on overhaul or parts.* Get the cheapest job possible, and buy automotive parts whenever they fit. (They may be heavier and not as durable but they are definitely cheaper.) This approach will guarantee a shorter aircraft life and will make buying a new aircraft

"Don't ignore the tires. Be a tire kicker."

"Don't be one of those airplane washers. The dirt . . . should form a protective . . . covering . . ."



periodically, a must! That takes care of the way Hotshot Jones handles the overhaul work.

When it comes to everyday maintenance, just follow this advice:

4. *Don't pay attention to 100-hour inspections, tune-ups, or plug changes.* If the aircraft checks out, keep it flying! When it starts cutting out, that's the time to start thinking about checking. It's true you won't get full power delivered and will consume more gas but it could be cheaper than a tune-up. (You might as well freeze the plugs in the cylinders while you're at it.)

5. *Don't worry about knocks in the engine or sneezing at cruise.* Just apply a little of that "let's wait and see" attitude. The knock may be opportunity. Such things clear themselves up mysteriously. Don't they?

6. *Don't keep washing the guck off the engine.* Only worry warts have the engine washed down or steamed regularly. The fire hazard isn't that great. It usually takes a while for the insulation on the wiring to erode.

7. *Don't change the oil unless it's tar-black and gritty.* Oil money saved can be used as pin money—for wrist pins and scarred cylinder walls.

8. *Don't be one of those aircraft washers.* The dirt and grime should form a protective and corrosive covering which will only eat away the fabric and metal. When the fuselage gets so grimy and dirty you can't see your NC number, that's time enough. If it takes a lot of elbow grease to clean it up, save time by using a strong abrasive. That'll really eliminate your problem, the fabric, that is.

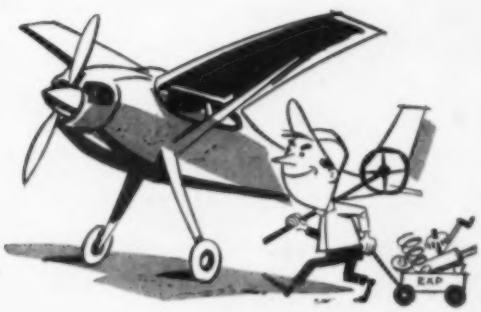
To find out if the fabric is good, press a thumb into the suspicious spot. This is particularly effective on control surfaces.

It pays to leave rust spots and dents on the fuselage just as they are. It pays, and pays, and pays.

9. *Don't wear out the light and radio switches.* Leave them ON when stopping and starting the aircraft. You will keep the battery and gen- (*Continued on page* 98)

"To find out if the fabric is good, press a thumb into the suspicious spot."

TO RUIN YOUR AIRCRAFT



"... buy automotive parts whenever they fit ..."

"Don't worry about overloading ..."

The airports closest to Squaw Valley are gearing their facilities to welcome the winter sports-minded airman spectator

FLYING TO THE OLYMPIC GAMES

By DON REEVES

Radio-TV Director, Winter Games Committee

AS ALL SPORTS-MINDED citizens must now be aware, the Olympic Winter Games are being held February 18-28, at a once-remote High Sierra amphitheatre known as Squaw Valley.

Located a few miles northwest of California's Lake Tahoe, transportation to the Valley will be by every known means, ground and air, by private and public vehicles. Those headed for the Games by airline will find ample scheduled flights, augmented by extra sections, by those air carriers which regularly serve Reno, Nev., among them United, Bonanza, and Western Air Lines. Charter flights undoubtedly will take care of many more.

How about facilities for the Olympic-bound airmen in privately-owned aircraft? The Games' Committee is expecting hundreds from all over the nation to fly in.

Excellent facilities are available, with Reno Municipal as most likely entry port for the airborne spectators, due possibly to the fact that Reno, only an hour from the Valley by a four-lane superhighway, and principal base for "package" tours to the Games, is shaping up as the most popular of the several housing areas around Squaw Valley.

Because of a flood of communications from private pilots, Reno Municipal, according to its manager, J. K. Hicks, plans to close one of its three paved runways to accommodate their aircraft. Service will be available at all hours, without increase in normal price level. There will be no landing fees; a night's tie-down is one dollar, and baggage handling from plane to counter is free.

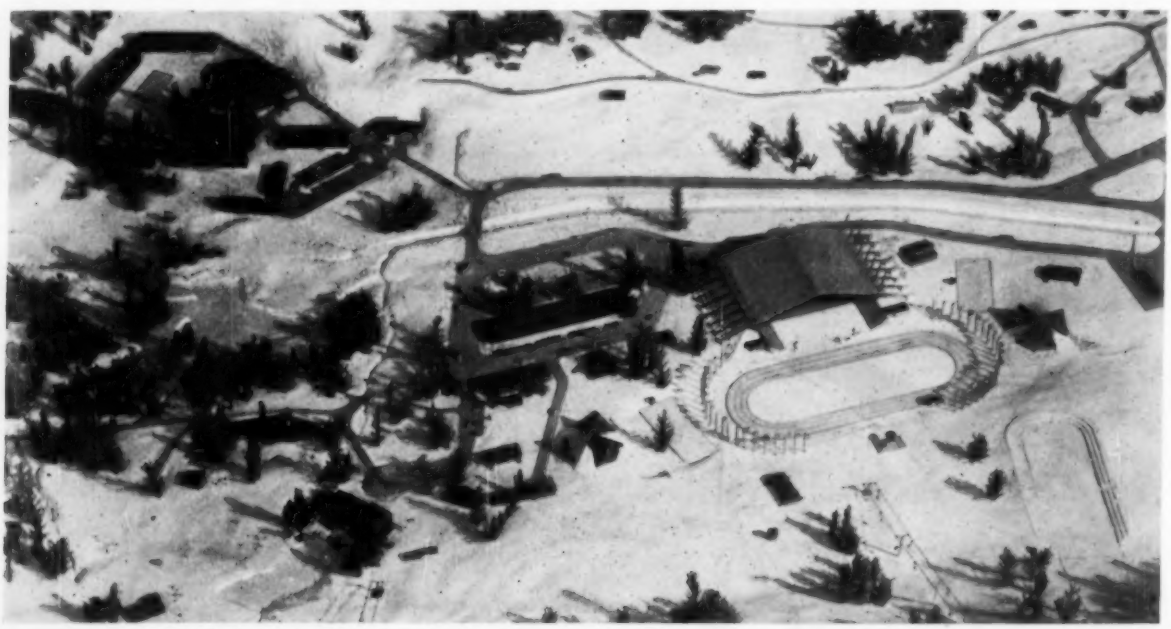
The field is equipped with an instrument landing system and has 24-hour control tower service. Landing facilities will be on a first-come, first-served basis, the overflow going to Douglas-Tahoe Field at Minden, according to Hicks.

For a smaller airport, I find the field at the south end of Lake Tahoe—about 28 miles from the Valley—very good in every respect. Although it is high (6,263 feet), I have found no difficulty in take-off, but you'll have to keep in mind there is a difference in high and low altitude take-off technique. Bus and rental car service is programmed here for the Games, but prospective users are urged to check with airport manager Bridgford before committing themselves to the landing.

The dirt strip at Truckee, Calif., is closest to the Games and I have been using it for months. However, there are no present plans that I know of to keep the field open for the Games. If you plan to land at Truckee, better drag the field first. There are no facilities, only a telephone.

Also within reasonable access to Squaw Valley are air fields at Auburn, Calif., Carson City, Nev., Placerville, Lincoln, Loma Rica in Grass Valley, Phoenix at Fair Oaks and Auburn, all in California, and, of course, the fine municipal airport at Sacramento.

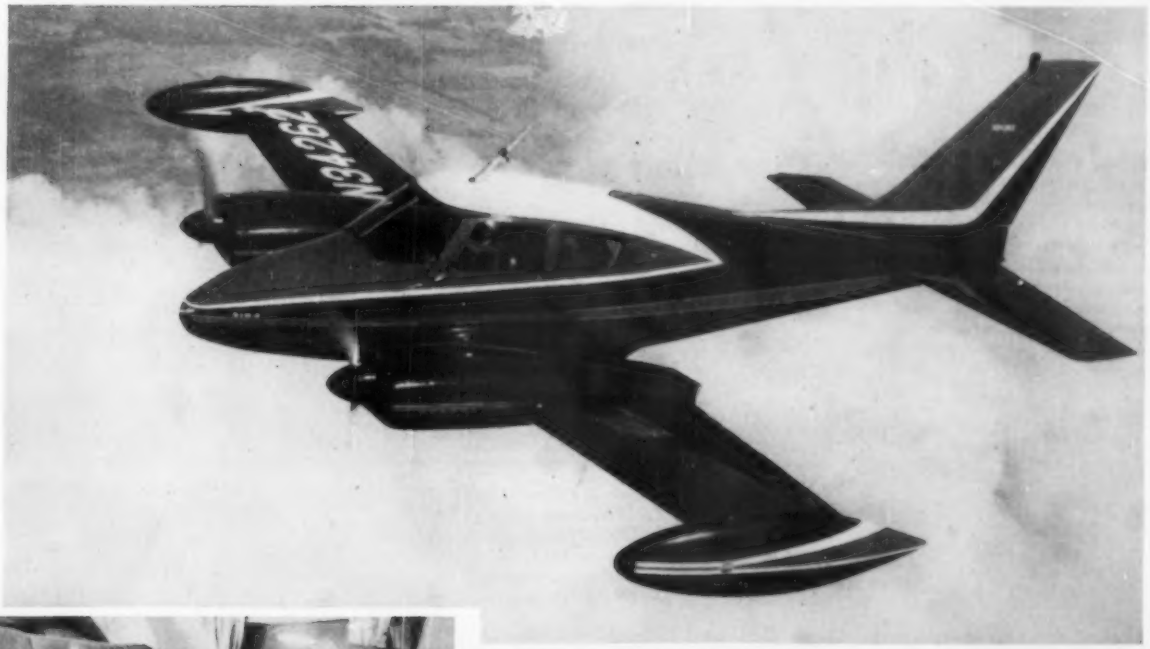
As for housing, most establishments in Lake Tahoe-Squaw Valley region are flying the Olympic Flag, which means they have agreed to keep prices at normal season levels; an average of $8.50 per day, with a top of $10. Arrangements may be made directly with the establishment of your choice or through the Housing Committee, Reno Chamber of Commerce, Reno, Nev. END



A plane's-eye view of the heart of Olympic activities looking north from base of ski slopes (lower right) over Olympic flame to speed skating rink.

FLYING NEWSREEL

CESSNA 310D. Below: The 1960 model of Cessna's twin engine executive plane features complete redesign of vertical fin to the swept back configuration, improvements in comfort and the addition of a non-congealing oil cooler. Flap mechanism was modified to accelerate flap actuation. Available are 13 different exterior color schemes. Interiors have been restyled and upholstered with a combination of nylon fabrics, leather, Raillite and Royalite. Top speed is 242 mph, at sea level, ceiling 21,300 feet. Price remains unchanged, $59,950.



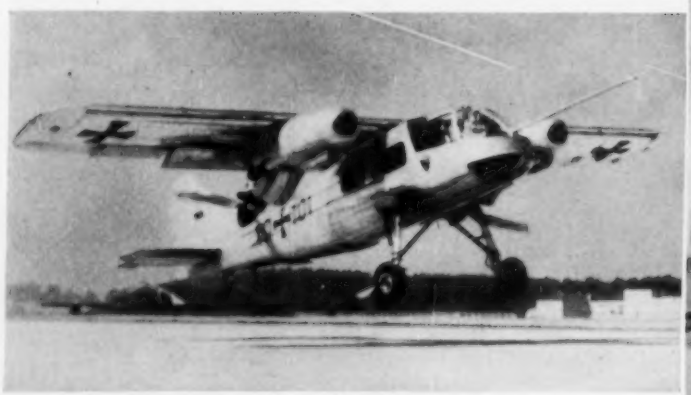
MET-CO-AIR of Fullerton, Calif., is out with a kit for conversion of Cessna 120, 140 and 140A to tricycle landing gear. Modification increases weight by only 22 pounds, does not affect performance. Price of kit $625. Cost of installation, $200.

AIRLINE PILOT trainer. SAAB Safir 91D, 18 of which were ordered by the Dutch Government Civil Flying School (RLS) for training of KLM airline pilots. RLS is unique organization, set up especially to train civil air line pilots. The Safirs will replace 46 airplanes of different types now used.

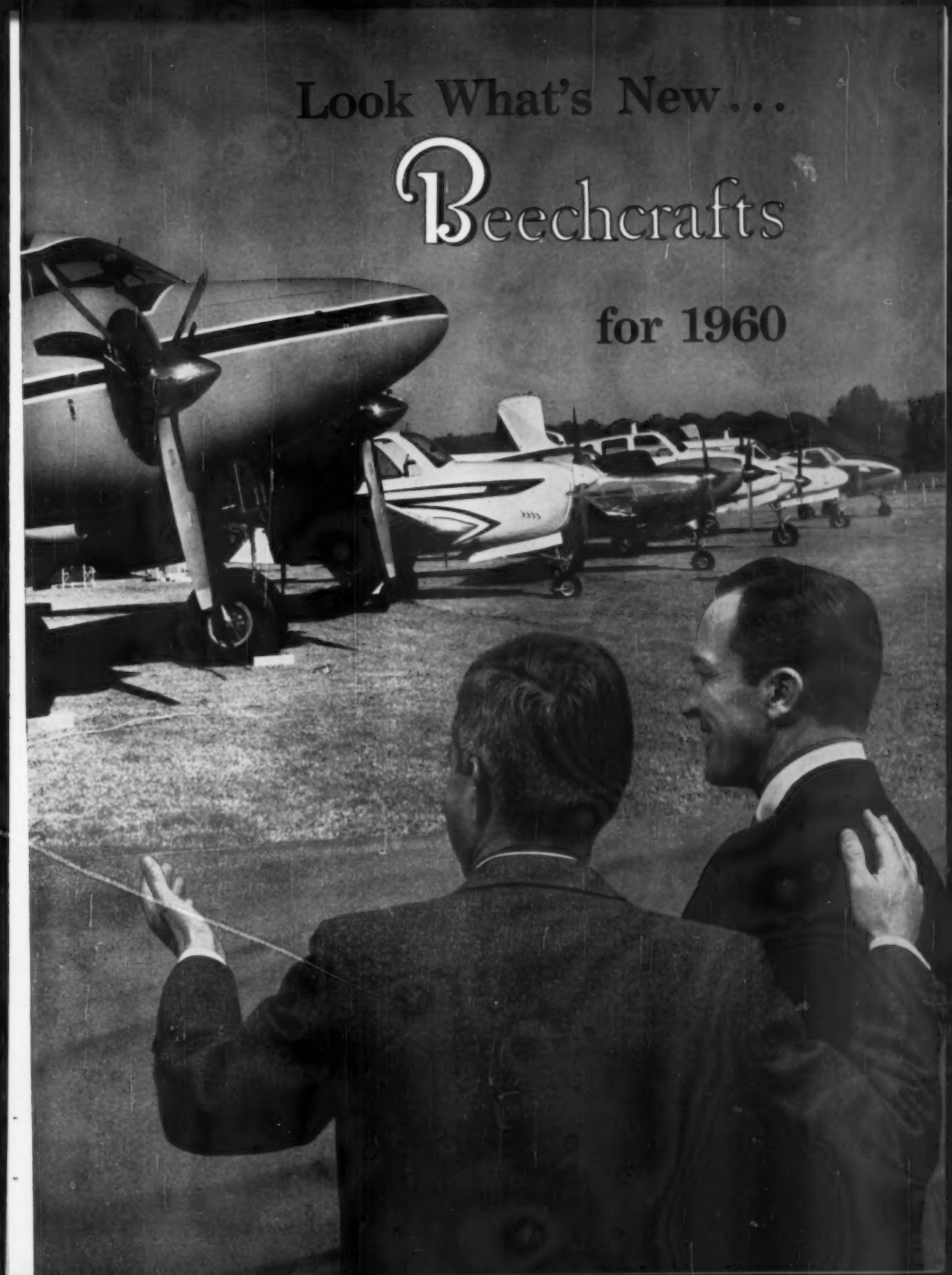
FLYING NEWSREEL

FLYING PLATFORM. Right: Developed by the Santa Barbara, Calif., division of Curtiss-Wright Corp. for U.S. Army, this vehicle is powered by a 425 shp gas turbine driving four special, variable pitch, propellers which provided vertical thrust. Turbine exhaust, directed backward, accounts for the greater percentage of forward thrust which propels vehicle.

FLYING SAUCER. Right: Developed by Princeton University for U.S. Army to test ground effect, this circular craft is powered by a 44-hp Nelson engine turning a horizontally mounted propeller and a 5-hp engine driving a prop in tail fin for yaw control.



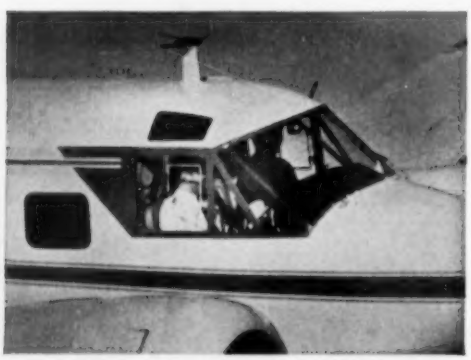
GERMAN STOL. Dornier Do.29, further development of the Dornier STOL line of single and twin engine aircraft. Plane features tilting propellers which together with the shafts can be deflected up to 90 degrees for short take-off. Note stone guards on wheels to protect propellers.


Look What's New...
Beechcrafts
for 1960

The airplane executive pilots prefer, the Beechcraft Super G18 can deliver up to 234 mph, and fly up to 1,626 miles non-stop.

What's New for '60 in the. . . Beechcraft Super G18:

Now the world's most popular executive transport is even more advanced for 1960. A favorite with pilots and passengers alike, the Beechcraft Super G18 is the biggest, roomiest airplane with the biggest load carrying capacity of any in its class. No other airplane has been more thoroughly tested and proved. Famous for its outstanding comfort, reliability and performance, this latest version of the fabulous "Twin-Beech" brings you a host of new improvements, including these . . .



Look for this distinctive new windshield design. Behind it, you'll find the roomiest, most comfortable pilot compartment in any business airplane—and a wonderful new world of quiet flight. You'll know it's for you.

- **New, bigger, re-designed cockpit** offers greatest headroom, and legroom ever. Adjustable pilots chairs.
- **Improved visibility** with new wraparound windshield and larger cockpit side windows.
- **Modern standby rocket power.** New factory installed JATO units give you extra "boost" for short take-offs with big loads.
- **New all-weather usefulness.** The Super G18 with weather radar, modern de-icing equipment, wing ice-lights, propeller anti-icing equipment has even greater "go-anytime" capability.
- **New customized radio "packages"** installed at the factory give you a wide selection of the most modern radio and navigation equipment built —including custom radar installations.
- **New custom interiors,** finished in your choice of soft, luxurious fabrics and fine grain leathers. Separate pilot and passenger compartment, plus separate lavatory-baggage compartment. Other appointments include deep-cushioned airliner-type chairs, refreshment bar and foldaway tables.

See your Beechcraft distributor or dealer now. Or, for illustrated Super G18 brochure and free copy of "Dollars and Sense of Business Flying," write Public Relations Department, Beech Aircraft Corporation, Wichita 1, Kansas, U. S. A.

Beechcraft

BEECHCRAFTS ARE THE AIR FLEET OF AMERICAN BUSINESS

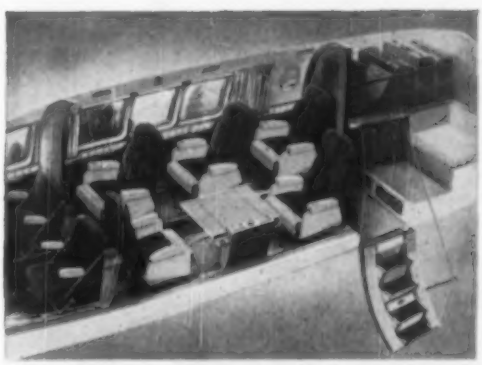
The new Beechcraft Queen Air is one of the world's easiest-to-fly airplanes. Custom equipped for all-weather performance.

What's New for '60 in the . . . Beechcraft MODEL 65 Queen Air:

Here is the only 6 to 7 seat business airplane specifically designed with the modern airliner features that America's flying business leaders told us they wanted in an executive transport. The new Beechcraft Queen Air is the only airplane in its class that combines airliner speed, comfort and convenience with the "small airplane" utility and low operating cost that modern business use demands. Here are just a few reasons that you, too, will choose the new Queen Air:

- **Large, roomy separate pilot compartment,** with sliding door privacy. Extra-large cockpit windows provide unexcelled visibility. Room for complete dual instrumentation.
- **Spacious, quiet "conference room" passenger cabin** with wider center aisle lets you walk and move about easily in flight.
- **Airliner-type "air-stair" door** for easy entry and exit.
- **Individual reclining seats,** extra wide and deep-cushioned, have modern "posture-ease" foam rubber construction. Optional arrangements include a 6½-foot couch for "stretch out" comfort.
- **Huge, shelved baggage compartment,** accessible in flight. Your bag, briefcase or dictating machine is in easy reach.
- **Airliner-type private lavatory.**
- **Nearly 4 miles a minute top speed** and custom all-weather performance. Up to 1,500 miles non-stop cruising range.
- **Big 340 h.p. supercharged fuel injection engines** give you exceptional fuel economy, power to spare up to 30,000 feet, and complete freedom from carburetor icing.

See your Beechcraft distributor or dealer now. Or, for fully illustrated Queen Air brochure and free copy of "Dollars and Sense of Business Flying," write Public Relations Department, Beech Aircraft Corporation, Wichita 1, Kansas, U. S. A.



Here is just one of many custom interior arrangements offered in the new Beechcraft Model 65 Queen Air. Optional appointments include extra chairs, adjustable lounges, food bar, coat closet and office-aloft equipment.

Beechcraft

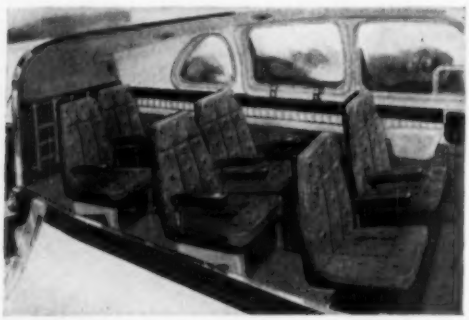
BEECHCRAFTS ARE THE AIR FLEET OF AMERICAN BUSINESS

With modern 340 h.p. supercharged fuel injection engines, the all-new Twin-Bonanza carries 6 at nearly 4 miles a minute in airliner comfort.

What's New for '60 in the . . . Beechcraft Twin-Bonanza:

Never before has an "old favorite" been so completely new as this big, roomy Beechcraft Twin-Bonanza for 1960. You have to see it to appreciate it!

Underneath its smart new lines, it's still the strongest, most rugged airplane in commercial aviation. And now, with a wide array of exciting new features, the Twin-Bonanza brings you a whole new world of comfort and convenience. With custom all-weather equipment, this is the "go anytime" 6-place airplane you've always wanted. Compare—and see how much more you get in the all-new Twin-Bonanza for 1960:



There's plenty of room to stretch out and move around in the spacious cabin of the new Twin-Bonanza. All interiors are custom finished in the finest fabrics and leathers. Optional seating arrangements include couches.

- **New "air-stair" door** for safe, easy entry and exit.
- **All-new spacious interiors** with a wide choice of optional seating plans, plus added headroom and center aisle roominess.
- **New baggage compartment, accessible in flight** from passenger compartment. Carpeted shelves and upholstered walls protect your bags and briefcases from scuffing.
- **New airliner-type reclining chairs** for relaxed comfort on long trips. Pilot's chair adjusts vertically, co-pilot's chair adjusts to left or right.
- **New year-round comfort control system,** with thermostatically regulated cabin temperature and optional air conditioner makes the Twin-Bonanza one of the world's most comfortable airplanes, no matter where you fly.
- **New "Eye Ease" cabin lighting system** reduces reflections and glare for easier, more relaxed night flying.
- **Advanced new de-icing system** gives extra protection against wing ice —yet weighs up to 50% less than other systems.

See your Beechcraft distributor or dealer now. Or, for fully illustrated Twin-Bonanza brochure and free copy of "Dollars and Sense of Business Flying," write Public Relations Department, Beech Aircraft Corporation, Wichita 1, Kansas, U. S. A.

Beechcraft

BEECHCRAFTS ARE THE AIR FLEET OF AMERICAN BUSINESS

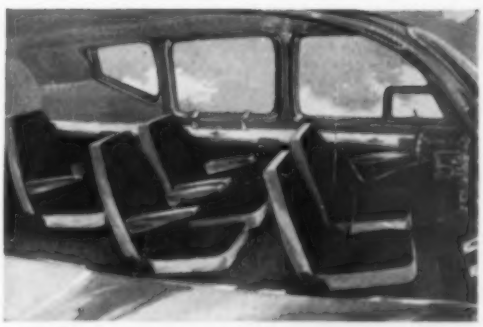
Now a 5-place plane, the new Travel Air is still the quietest, easiest-to-fly and easiest-on-gas twin in the 200 mph class.

What's New for '60 in the . . Beechcraft Travel Air:

Now the fabulous Beechcraft Travel Air, America's quietest, easiest-to-fly light twin, moves even farther ahead. All the wonderful handling ease is still there . . . all the rugged dependability . . . the easy way it has with fuel. But now, with a long list of new features and advantages to offer you in 1960, the Travel Air is even more the outstanding business twin in its class. Here are just a few of the reasons why:

- **New! Bigger, roomier cabin** has 17 cu. ft. more space for passengers and baggage. Larger than any other twin in its class.
- **Now seats 5 big passengers** in individual deep-cushioned reclining chairs—and all passengers face forward, with plenty of headroom, hiproom and legroom. Full-size baggage compartment, too! Optional fifth seat.
- **Quietest light twin in the sky.** Even at 200 mph, the Travel Air's super-soundproofing lets you cruise in relaxing "Quiet Sealed" comfort no other twin can match.
- **A real "miser" on fuel.** Up to 11 miles per gallon—more than any other twin-engine business airplane.
- **Extra-low maintenance** cuts operating costs even more.
- **Extra-long range** lets you fly up to 1,410 miles non-stop.
- **Easiest-to-fly of any light twin**—the ideal airplane for single-engine pilots moving up to a twin.
- **New comfort control system** keeps you warm in winter, cool in summer—automatically—wherever you fly.

See your Beechcraft distributor or dealer now. Or, for illustrated Travel Air brochure and free copy of "Dollars and Sense of Business Flying," write Public Relations Department, Beech Aircraft Corporation, Wichita 1, Kansas, U. S. A.



New 5-seat interior has plenty of "stretch-out" room even for 6-footers . . . plus full size baggage compartment. Custom interiors finished in rich fabrics and leather trim in your choice of colors.

Beechcraft

BEECHCRAFTS ARE THE AIR FLEET OF AMERICAN BUSINESS

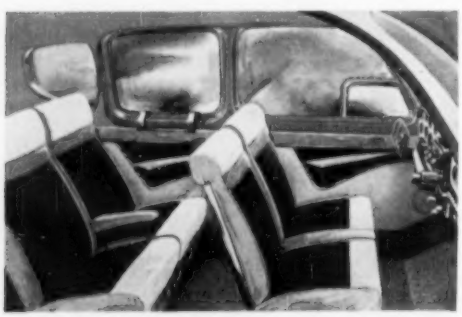
Still away out in front with fuel injection, the Bonanza has a top speed of 210 mph and optional seating for five.

What's New for '60 in the. . .Beechcraft Bonanza:

Over 6,000 Beechcraft Bonanzas have firmly established the reputation of this distinctive airplane as the ultimate in single-engine business planes.

In flying ease, speed, luxurious quiet and comfort, strength, operating economy and low maintenance, the Bonanza has no equal. First with fuel injection, the Bonanza is still years ahead of its field in 1960.

Here are just a few of the many reasons w_ you, too, will acclaim the Bonanza the outstanding airplane in its class:



Compare this spacious soundproofed cabin with that of any other single-engine business airplane. Deep-cushioned individual reclining seats, foam headrests, and other refinements make every trip a genuine pleasure.

- **World's fastest** all-metal single-engine business airplane. Cruises at 200 mph with only 75% power.
- **Amazing fuel economy and longest range.** Delivers nearly 20 miles per gallon with fuel capacity for over 1,200 mile range.
- **Extra rugged construction** permits the Bonanza to be licensed in the Utility Category. You get extra load carrying ability and reduced maintenance with the Bonanza's extra-strength design.
- **More room for passengers and baggage,** with more comfort than any other single-engine business airplane.
- **High visibility low-wing design** lets you see ahead of the turn during flight maneuvers and in the pattern.
- **Tastefully appointed custom interiors** finished in your selection of new luxurious fabrics and imported leathers.
- **So easy to fly,** with coordinated controls, wide rugged tricycle landing gear and even better "hands off" stability that you won't believe it until you take the wheel yourself!

See your Beechcraft distributor or dealer now. Or, for fully illustrated Bonanza brochure and free copy of "Dollars and Sense of Business Flying," write Public Relations Department, Beech Aircraft Corporation, Wichita 1, Kansas, U. S. A.

Beechcraft

BEECHCRAFTS ARE THE AIR FLEET OF AMERICAN BUSINESS

What's New for '60 in the . . . Beechcraft MODEL 33 Debonair:

Now you can enjoy Beechcraft performance, comfort and dependability for as little as $19,995 with the new Beechcraft Model 33 Debonair.

Now, with the new Beechcraft Debonair, Beechcraft introduces a new standard of comparison in its price class. Everything about this new airplane bears the unmistakable hallmark of Beech craftsmanship. You see it in the rugged design, in the clean "let's go" look and in the tastefully appointed, luxuriously roomy interior. Compare these and other features and you will agree the Beechcraft Debonair is the new pacesetter in the middle-priced field:

- **225 h.p. continuous-flow fuel injection engine** for "get there fast" speeds, easier starting at any temperature, more uniform fuel distribution, smoother operation, extra power and more than 17-mile-per-gallon fuel economy.
- **Cruises 185 mph with 75% power.** 195 mph top speed.
- **Flies up to 1,170 miles non-stop** on only 68 gallons of fuel.
- **Climbs at more than 1,000 feet per minute** to top weather and terrain in a hurry. 19,800 ft. service ceiling with full load.
- **Strongest, most rugged plane in its price class.** Licensed in the Utility Category.
- **Plenty of "pick up and go."** Even with full fuel tanks, it has a big 837 pound allowance for 4 passengers and baggage.
- **Larger windows and better visibility** than any other airplane in its field. High visibility low-wing design lets you see ahead of the turn in all maneuvers.
- **Wide rugged landing gear** proved by millions of landings.

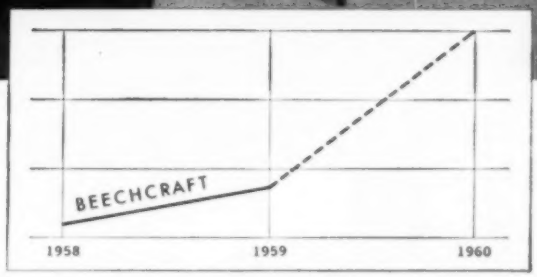
Here is the one you've waited for—and so easy to fly! See your Beechcraft distributor or dealer now. Or, for Debonair brochure and "Dollars and Sense of Business Flying," write Public Relations Dept., Beech Aircraft Corporation, Wichita 1, Kansas, U. S. A.

Relax in famous Beechcraft comfort in wide, posture-contoured seats. Deep-textured wall-to-wall carpeting, super soundproofing, 4-position throw-over wheel and other deluxe appointments add to your comfort and pleasure in this remarkable new Beechcraft Debonair!

Beechcraft

BEECHCRAFTS ARE THE AIR FLEET OF AMERICAN BUSINESS

Interested in a Beechcraft Dealership?



Beechcraft sales are zooming. 1959 was the biggest sales year in Beechcraft history (see chart at right). As a franchised Beechcraft Dealer, you can share in this growth. Choice territories now open. Start building your future with America's most-wanted, most complete line of business airplanes. Why not get more facts now? For full information on Beechcraft dealer opportunities, write Beech Aircraft Corporation, Wichita 1, Kansas, U. S. A. or . . .

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Montgomery Aviation Corp.

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Sea Airmotive, Inc.

ARIZONA
Phoenix
Cutter Aviation, Inc.

ARKANSAS
Little Rock
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CALIFORNIA
Bakersfield
Alpha Aircraft
Fresno
Aero Sales & Serv., Inc.
Los Angeles (Van Nuys)
The Norman Larson Co.
Oakland
Golden Gate Aviation, Inc.
San Bernardino
Tri-City Airport
Santa Ana
Martin School of Aviation, Inc.
Stockton
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Topeka
Topeka Aircraft Sales & Service, Inc.
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WASHINGTON
Seattle
Sulak Manufacturing Co.
Spokane
Western Aircraft Corp.

WISCONSIN
Milwaukee
Butler Airplane Sales

FLYING NEWSREEL

MISSILE CARRIER. Right: a Bell HU-1A helicopter equipped with surface-to-surface missiles has been undergoing tests at the Army's Redstone Arsenal, Ala. Missiles are wire controlled SS-IIs manufactured by Nord Aviation of France for the U.S. Army and are guided to target by the co-pilot gunner. Their maximum practical range is 3,500 yards and, with armor-detecting warhead, they can destroy any tank.

RECORD BREAKER. Above: Kaman H-43B, a development of the piston engined 43A model, is powered by a Lycoming T53 free turbine rated at 860 shp. This model has recently established a new world altitude record for helicopters of 39,100 feet, previously held by Russia.

KAMAN KA-17. Below: Two-place, cold cycle pressure jet helicopter powered by a 400-hp Blackburn "Turmo" turbine driving a Boeing centrifugal compressor, supplying air through hollow spars in rotor blades to tip nozzles. Top speed is over 90 mph, gross weight 1,700 lbs.

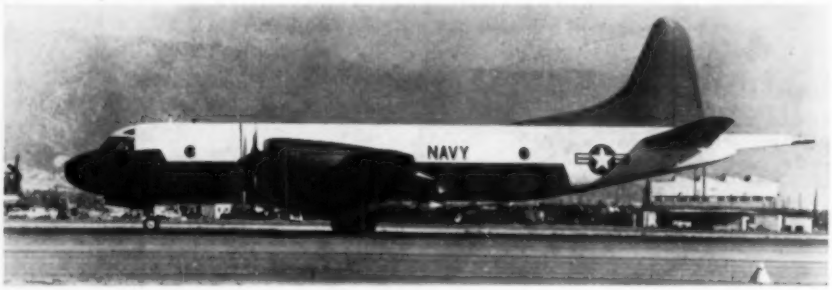
KAMAN H2UK. Right: U.S. Navy's new high speed, all-weather helicopter. Powered by a General Electric T58 turbine rated at 1,050 shp, it is constructed of light materials and is a radical departure from Kaman's philosophy of intermeshing rotor copters. Ten passenger civilian version is also being planned for the future.

FLYING NEWSREEL

SUPERSONIC PETALS. Below: The four large hinged sections around the tail pipe of the Republic F-105 act as dive brakes. Four swing open to slow the fighter while it performs aerial maneuvers, just the upper three are used for landing. When closed, they form a tight nozzle over the tail pipe.

BUGEYED MONSTER. Above: A striking head-on view of the English Electric P.II Lightning, two-place version of Britain's supersonic fighter. Scheduled to serve as an advanced trainer it is also slated as operational aircraft when equipped with guided missiles such as two Firestreaks shown in photo.

NAVY ELECTRA. Right: Lockheed P3V-1 anti-submarine patrol plane, a militarized version of the Electra turboprop airliner. Equipped with electronic detection gear, in the long stinger tail, the plane can also destroy the submarines with torpedoes, depth charges and special weapons carried in its bomb bay. Rockets and other armament are mounted on wing pylons.



PARADOZER. Above: A ten-ton bulldozer leaves a Lockheed C-130 Hercules turboprop military transport pulled from its cargo hold by an extraction parachute (not shown on photo) during exercises at Camp Breckenridge, Ky. Dozer is lowered to the ground by six chutes.

again for '60 Mooney sets the pace

...luxurious comfort...unmatched economy...ease-of-flying! Never has an airplane dollar bought so much speed, safety and comfort as in the 1960 Mooney. Continuing its leadership in the high-performance *and* economy concept of aircraft, Mooney's Mark 20A for '60 offers new advancements and greater opportunities for both business and pleasure use.

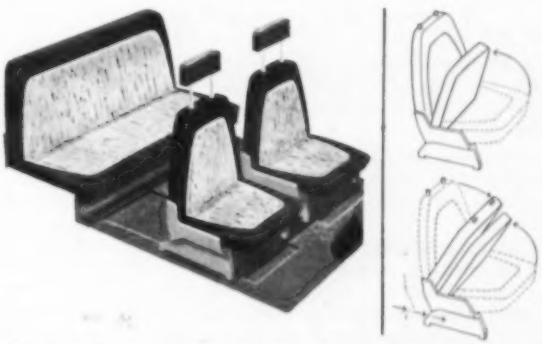
Teamed with Mooney's *unmatched economy* is the luxurious comfort of quality-tailored interiors *and* all-new seat styles.

No airplane is easier-to-fly than the Mooney. Both beginners and experienced fliers call the Mark 20A "a pilot's dream airplane."

The Mooney *standard of excellence* for 1960 includes:

- Speeds up to 190 m.p.h. and dependable 180 h.p. Lycoming engine.
- Easy-maintenance retractable landing gear with new down-lock system, including position lights.
- Noise-free cabin with added soundproofing, thicker windows and new no-maintenance exhaust system.
- Airline-type ventilation system.
- Retractable footstep for easy entrance and exit.
- Wide tri-cycle landing gear for accurate control on the ground.
- New and improved braking system.
- Lowest full-coverage insurance rate.
- Fully shock-mounted instrument panel, designed for easy, accurate reading and utility.
- New and original life-time maintenance warranty.

See and fly the 1960 Mooney at your dealer's . . . enjoy the feeling of quality and a sense of craftsmanship which are "safe-flight" engineered in every detail.

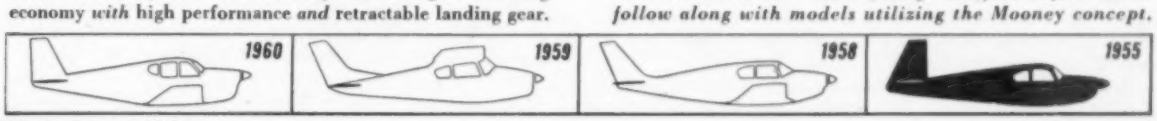


Plush new interior featuring rich new fabrics and completely redesigned seats provide a new era of elegance for the Mooney. Personalized comfort is assured in soft, contoured seats, individually controlled with reclining seatback and adjustable headrests.

MOONEY AIRCRAFT, INC. **Kerrville, Texas**

Since 1955 Mooney has manufactured its jet-age style of executive aircraft with clean aerodynamic design combining economy *with* high performance *and* retractable landing gear.

Its proven success by public acceptance and millions of flight miles has caused three other leading aircraft manufacturers to follow along with models utilizing the Mooney concept.



NO. 237

I learned about flying from that!

Easily recognizable by day, the countryside can look very unfamiliar to a student pilot on his first solo night cross-country flight.

By REX L. McARTHUR

"ALICE control, this is Blue 21. Over."

"Blue 21, this is Alice control. Over."

"This is Blue 21, over your station at three-five, 4,000 feet. Over."

"Blue 21, this is Alice control. I cannot identify you. Flash your landing lights. Over."

"This is Blue 21, flashing landing lights. Do you see me? Over."

"Blue 21, this is Alice control. Negative! Are you directly over our station? Over."

"This is Blue 21. *Affirmative!* Over."

Just then another pilot broke in to give his position report. It went like clockwork. He reported, was recognized, and proceeded to Jane, our next reporting point.

Alice control's last transmission, "Are you directly over our station?" puzzled me. Now I wasn't sure. Maybe I had made a mistake. But where? Where had I goofed?

I kept circling the brightly-lit city below me, searching the dark, partially overcast night for the control ship. There was no airstrip at La Grange, so Alice control was going to circle the city at 3,000 feet putting the control ship about 1,000 feet below me. It should be easy to see with that rotating red light, I thought to myself. But Alice control was nowhere in sight. There were only the twinkling lights of a small central Texas city, which I thought to be La Grange. But was it? And if not—where the . . . was I?

Earlier in the evening—before I had preflighted my L-19—I had thought it was just another night cross-country. Only on this one I'd be alone. How simple my first night cross-country had seemed. Mr. Medlock, my instructor, didn't have to say a word. All my check points and ETA's came up as planned. And I had landed back at Camp Gary in only a minute less than my estimated lapsed time on my flight plan.

But tonight was different. Everything was different. Wait a minute now, McArthur; you can't get rattled. Remember all those classes you had in navigation. How about that movie you saw? "You're never lost until you have flown your ETA plus five minutes," the man had said. I remembered the movie all right. But what the movie failed to say was what to do if you weren't sure whether or not you were lost. The movie also had emphasized the importance of a good flight plan. What was it the instructor had said? "Plan a good flight—fly a good plan." Sure, that was it.

Recalling those moments back in the flight shack while planning my flight, I had thought, no sweat. Just another cross-country. I had hurriedly plotted my courses, computed my ETA's and given the completed plan to Mr. Medlock who quickly checked it over and kicked me in the parachute on my way out the door.

It's funny how quickly so many things can pass through your mind when you're flying alone at night.

Looking out at the blackness around me, occasionally I'd catch a glimpse of a flashing navigation light of another aircraft. Maybe it's one of my classmates on his way to La Grange, I thought. But this was no time to go chasing after unknown aircraft.

The countryside below looked bleak and dark. The Colorado River should be visible meandering from Austin through Smithville to La Grange. But even a large river would be masked by the surrounding blackness.

I had flown over this country in the daytime, and well remembered the scrub-oak covered plains scarred by eroded gullies. The towns and highways were easy to recognize then. But not tonight.

A check of my fuel gauges showed the left tank to be down about a half; the right tank was still three-quarters full. The thought of a forced landing in this grim terrain was most unpleasant. The situation called for action. I took my flashlight and Austin sectional out of the map case. The plotted headings seemed to be okay. I wondered if the wind had shifted. I remembered the lights of the city I thought to be my reporting point. It was off to the left of my course a few degrees, but my ETA was only a minute or so away. The wind must have blown me to the right of my course, so I kicked a little left rudder and headed for the city lights. My ETA over the city checked out perfectly with the time plotted, so I reported to Alice control.

Maybe I had computed my ETA wrong. It was possible. I had always been careless with figures. Rechecking the figures on my flight log was difficult with a dim flashlight, but they proved to be five minutes off.

I checked the figures again and, sure enough, I had made an error in addition back in the flight shack. My ETA came up five minutes sooner than it should have. By checking my map again, and allowing for a five-minute time error and the change in course, I concluded that I was now over Smithville, a city about the same size as La Grange, my checkpoint, and roughly 20 miles west-northwest. This was probably the only correct conclusion I made all night.

Getting from Smithville to La Grange should be no problem, I thought. All I have to do is pick out the biggest group of lights in a general east-southeast direction and follow my nose for about five minutes.

After setting my course, I rechecked my fuel. Still have about an hour and a half flying (*Continued on page* 105)

Who told you that under water is a wonderful new world?
You found out for yourself!

Find out for yourself what it's like to fly the big LAKE 4-Place AMPHIBIAN

Let's come right out with it. You know aircraft — but do you know as much as you'd like about this big Lake Amphibian? Time and again this lively, *double-duty* beauty is proving to be just what you, or your company, are looking for. Find out!

Double-duty? Lake's Skimmer is that way by the very fact it is *amphibian*. Give it a plot of land or a puddle of water — it soars in like a bird, with power off, for a sweet safe landing. Taking off, it jumps from the water or skims up from the ground, literally in seconds.

It's "double-duty" in performance, too. Ruggedly built to be the workhorse of the business-flying field, it has multi-engined feel and stability even in the roughest air. At the same time — *you'll be amazed* — this agile amphibian has a lively, light-hearted handling-ease and maneuverability land planes can envy.

Fly it! The Lake . . . America's one-and-only single-engined amphibian . . . is your tough-hearted partner in doing man's big work in industry and transport right around the world. Its profile is a beauty but it's the plane itself you'll like.

Made for *land-and-water*, it takes you to more places and safely brings you back again than any land *or* water plane can do. And if it's good to look at, is there any harm in that?

Webster

"Closest thing to a pair of wings!"

says Captain H. F. Webster, USNR (Ret.) Kirkland, Washington, well-known naval pilot

"The Skimmer is the greatest single-engined plane I have ever flown, regardless of horsepower and weight, configuration, or price," Webster reports.

"It flies with unmatched stability. Positive control and rugged construction make you feel at ease in the air under any condition. Older amphibians glide like a brick. Even with a dead engine, this plane glides like a feather."

Short landing, easy water touchdown, sharp rate-of-climb and agility to get in and out of small places — these are among the factors influencing Webster's final opinion:

"The Skimmer is a wonderful flying platform — the nearest thing to a pair of wings you could experience."

Write or phone for complete Lake specifications and the name of your nearest dealer. We'd like to have you know us — and to know *you*.

Be an expert!

Know these Seven Points of Perfection about the Lake Amphibian

1. **Agility:** A 78 MPH differential between stalling and cruising speeds means greater safety, good climb out, easy approach, short take-off.
2. **Water Handling:** Hull is designed for easy water handling — just like a boat. Down wind turns are completely safe as in no other plane. Cross wind control during landing, taxiing and take-off is unmatched.
3. **Speed and Range:** Cruising speed up to 131 MPH. Long range compares favorably with land planes of equal horsepower.
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5. **Visibility:** Unsurpassed because pilot rides ahead of wing and engine, just like a jet.
6. **Comfort:** Big, wide cabin compares with largest single-engined land planes. Provides generous leg and shoulder room for four people.
7. **Construction:** Rugged all-metal, salt water corrosion-proofed construction, dependable Lycoming 180 H.P. engine extra-wide-tread tricycle landing gear contribute to high safety factor.

No other plane . . . looks . . . flies . . . like the Skimmer

Lake AIRCRAFT CORP.

MANUFACTURERS of the Skimmer
Sanford, Maine • Telephone: 2390
John F. Strayer, President

Facilities and Materiel

(Continued from page 31)

the Federal Airway System; the administration of the federal aid to airport program. The Bureau of Facilities and Materiel is now engaged in construction of Dulles International Airport serving Washington, D. C.

RADIO FREQUENCY MANAGEMENT

Much effort has been devoted to study of the problem of overcrowded radio frequencies.

Recognizing increased importance of our frequency work, we created a separate division in 1959 to handle it.

NEW PROCUREMENT RESPONSIBILITIES

Under a recent reorganization, the Bureau will have responsibility for procurement of materiel for establishment, maintenance and repair of air navigation and air traffic control equipment. A Facilities and Materiel Depot, reporting directly to the Bureau, will be established at the FAA operated Aeronautical Center at Oklahoma City. The depot will assume responsibility for aircraft and avionics standardization, central warehousing and materiel distribution for the Agency and shops for repair and fabrication of navigation and air traffic control equipment.

AIRPORT IMPROVEMENT AND MODERNIZATION

Congress provided $63 million for each of fiscal years 1960 and 1961 for federal participation in construction and development of airports. Allotment of these funds is the prime task of the Airports Division.

The FAA adopted a policy to channel funds into improvements to increase the safety of airport operation. Meeting this requirement are items of airport landing area development, such as runways, taxiways, aprons and field lighting. Included also are items such as land acquisition, obstruction removal, and building space to house airport air traffic control, communications and weather reporting activities. Such items were afforded first priority in preparing the national program.

A total of 228 airport construction projects have been programmed for the United States and territories under the Federal Aid Airport Program for the fiscal year 1960. This program calls for the expenditure of $57,076,702 in federal funds. An equal amount in matching funds will be raised by local project sponsors.

The allocation of funds was based on an appropriation of $63,000,000 by Congress under a two-year extension of the Federal Airport Act. An additional $63,000,000 will be available for airport work in fiscal 1961 which begins July 1, 1960.

CIVIL-MILITARY COOPERATION

The common air navigation and air traffic control system prescribed by the Federal Aviation Act has greatly increased the cooperative actions of the FAA and military aviation. To bring about the desired common system, the Bureau of Facilities and Materiel maintains contact with the military departments. Joint civil-military planning and joint use of radar, communications, navigation aids and air traffic automation projects have been very effective.

During the past year an intensive effort was made by FAA and the military departments to coordinate civil and military airport planning.

UPGRADING THE AIRWAYS

Our aviation facilities system is growing rapidly in size and complexity. Until a few years ago, we were rapidly falling behind in our ability to keep up with the jet-propelled growth of aviation.

In fiscal 1959, the Bureau spent or obligated approximately $89 million to procure, build, and phase into operation complex, costly electronic equipment used for air navigation communication and air traffic control service. About $12 million in International Cooperation Administration funds was spent to buy, install or maintain air navigation aids for other government agencies and 16 foreign countries.

Specifically, the money went to obtain or put in operation such facilities as VORs (very high frequency Omnidirectional radio range—a ground radio navigation station); VORTACs (an integration of VOR and the military TACAN system of short-range air navigation); ILS (the instrument landing system); long-range and airport surveillance radars; high-intensity approach lights; four-course radio ranges; air route traffic control center; airport traffic control towers; data processing systems; air/ground communication facilities; and the landline and terminal communications required to interconnect the coast-to-coast network of facilities.

Radar is being used more to increase air traffic control capability along the air routes and in congested air traffic areas. During 1959, the radar beacon system—a new type of aid that forms part of our new secondary radar system—was introduced to give air traffic controllers the ability to identify aircraft more quickly, more positively and to exercise better radar control over air traffic.

NEXT MONTH IN FLYING

★

INSIDE STORY OF THE HORTONS

Bill and Dorthe Anne Horton, unique husband-wife team, have built an international reputation outfitting business plane interiors, and now tie in with four other firms to offer a one-stop modification center.

★

NEWARK AIR SERVICE

This pioneer firm, which still maintains highest standards of service, is the subject of the latest report in FLYING's series on outstanding operators.

MAINTENANCE OF NAVAIDS AND FACILITIES

Maintenance of various facilities comprising the Federal airway traffic control and navigation systems is a difficult and complex job. First, these facilities must operate 24 hours a day, every day of the year. Second, except in certain cases, they operate unattended except where the type of equipment requires frequent manual adjustment or where the maintenance workload is sufficient to require one or more maintenance men.

Other difficulties arise from the many kinds of service offered, different types of facilities operated, their increasing complexity year by year, and their widely scattered locations. FAA airway facilities extend from the Arctic Circle to the Equator, covering the United States and Alaska and much of the Caribbean and Pacific. Many military facilities are maintained by FAA for the armed forces.

Our basic maintenance objective is to provide reliable service by all facilities under our jurisdiction.

Accuracy is considered of primary importance in all FAA maintenance. Continuity of service is second only in importance to accuracy, because of the lesser consequence from a safety viewpoint.

The highest goal, of course, is to have *no interruptions to service*, but this is usually unattainable. Therefore, we strive to have *as few* and as short interruptions as possible.

Preventive maintenance is done on a scheduled basis. Corrective maintenance is performed to remedy equipment failure. Every effort is made to design reliability and maintainability in FAA equipment. To add extra safety we provide standby equipment.

Maintenance technicians are required to make emergency repairs during their off-duty hours to restore service when a breakdown occurs.

At various times consideration has been given to accomplishing maintenance work by contract. Some parts of the total job are now being done by contract, e.g., painting of buildings and structures, repairs to roads and grounds, and similar work which is not directly associated with the technical performance of facilities and equipment. The Bureau, after extensive investigation, has found that there are excellent reasons for the FAA to perform maintenance. One overriding reason is that FAA's contribution to national defense would be seriously jeopardized if a shift to contract maintenance were undertaken. It is unlikely that any commercial contractor, regardless of his resources, could carry out this complex technical job.

Since safety for the aviation public is absolutely paramount, we must consider the possibility of contract personnel becoming involved in a strike. Government employees are forbidden to strike or engage in work stoppages. This would not be true of commercial contract personnel. Such action could possibly result in the unsafe operation of facilities or complete shutdown of the system. END

Drops 1800 feet to film falling "body"

The site: On location at Grand Canyon with the cast and crew of Columbia Picture's "Edge of Eternity."

The scene: A wild fight-to-the-death on an aerial tramcar high above the Canyon.

The problem: How to film the murderer's "body" as it hurtles to the rocks below.

The solution: By Bill Hartley, flying for Skymasters International. To film this scene he dropped his camera-equipped Bell 'copter 1800 feet . . . despite violent winds and turbulence in the Canyon.

Actually, this job was all-in-a-day's work for this veteran helicopter pilot. Bill was the first to evacuate troops from "Pork Chop Hill". . . first to pilot a 'copter through Khyber Pass . . . first to land on Mt. Hood and Mt. Lassen.

"I've got 12,000 hours with Chevron Aviation products," says Bill. "I'd never take a chance on any other products, especially on a risky job! Chevron Aviation Gasoline and RPM Aviation Oil keep my engine clean, always ready with emergency power when I need it!"

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STANDARD OIL COMPANY OF CALIFORNIA

HANGAR FLYING

ALERTNESS PAYS OFF

ON MY FIRST solo cross-country I learned that staying awake and alert is the greatest safety feature of flying.

Having completed my dual cross-country requirements the previous week end, I carefully checked the weather and winds aloft in preparation for the solo hop and took off in my newly overhauled and recovered 65-hp Taylorcraft for Pratt, Kan., a distance of 129 miles. The trip was uneventful and with the aid of a tailwind I landed at my destination an hour and 35 minutes later.

Arising early the next morning, I was driven to the airport by my brother-in-law. We started the engine and after he took some pictures of the ship, I took off into the south wind.

At 200 feet the T-craft shook from the turbulence but I continued to climb, clearing the traffic and heading for home at 800 feet above the ground.

My check points were right on the nose but, being half asleep, I did not notice that time flew faster than the plane. After nearly two hours and over half of my gas gone, I began to wonder whether Liberal could be made without a refueling stop, as the ground speed computed at a mere 40 mph. Possibility of getting there at this ground speed was very doubtful. To be on the safe side, I deviated slightly to the west in order to land at Meade, Kan. and refuel.

Ten miles from Meade I decided to drop down and check the ground speed into Meade. As I swung around to the north of the town to land south on the north-south runway, I spun the computer. Ground speed 73 mph. Ah! That is much better. Nearly 35 mph faster at 75 feet above the ground. The computer also told me that at this speed, home was 32 minutes away. With 35 minutes of gas remaining plus almost two gallons in the header tank which would give me a 20 minutes reserve, I could make it easily. The decision to land and refuel was abandoned and, by keeping an altitude between 50 and 75 feet above the flat Kansas land, a safe arrival home was made 35 minutes later.

DR. L. R. ARMSTRONG

Liberal, Kan.

A STORMY CHRISTMAS

IT WAS Christmas Eve, and the night before four inches of snow had fallen in Denver, Colo. I had recently won my private license and, after a total of 60 hours, considered myself an experienced pilot.

My brother Glen and I decided at the last moment to drop in on our parents for Christmas. They lived in Newman Grove, Nebr., a small town 35 miles southwest of Norfolk. We drove to the airport at nine in the morning, borrowed a broom to sweep the snow from my 1941 Taylorcraft and, after checking with the weather, were ready to take off. Although it was clear in Denver, an overcast prevailed much of the way to our destination, Grand Island, but nothing was expected to prevent visual flight conditions.

At first everything seemed perfect. The sun was shining and not a cloud was in sight. I tuned the receiver to Akron, Colo. and things looked very simple. Within a short time we were able to see a long bank of clouds on the horizon and I was forced to descend to 1,000 feet to stay beneath them. We could still see some distance ahead and concluded that this was the overcast the weather men had warned us about. Soon, however, the clouds seemed to lower and we found ourselves flying at 300 feet, unable to see far ahead but still able to watch an occasional farm home or cornfield from the side windows. We considered turning back but decided to stick with it a little longer and, sure enough, when our radio brought us over Akron, the overcast was lifting and we were again able to fly at 1,000 feet to our first refueling stop, Lexington, Nebr.

Here we were delayed as no one was at the field because of the holidays. A telephone was available, however, and we refueled when the manager hurried out in response to our call.

On our way again, the overcast continued and, after flying for some time, we noticed an occasional snowflake bouncing off the windshield. These rapidly worsened to a heavy snow-storm and we again found ourselves flying in poor visibility, depending on our small radio to keep on course. We had not reckoned with the early darkness of the mid-winter, and cruised the Taylorcraft as fast as we could in an effort to reach Grand Island before darkness fell. There were no lights on the plane and I had no experience flying at night.

The snow on the ground seemed to prolong the dusk just long enough for us to reach Grand Island and the only remaining problem was to find the unfamiliar airport. Our chart indicated the direction from the city and, after circling once, we found the flashing beacon. The snow-covered, white runway contrasted against the fields next to it and I sat the plane down, surprised by the amount of snow which called for full power to taxi to the hangar.

My brother and I considered the day quite an experience and, concluding that we had met the worst the weather could throw at us, attended church services that evening confident that we could continue in the morning. Christmas Day found us at the airport where the overcast continued but the snow had stopped. Heavy equipment cleared the runway and, after another consultation with the weatherman, we took off for Albion.

Flying at 1,000 feet, we crossed the Platte River whereupon the overcast forced us progressively down to 500, 300, 100 and less in order to stay beneath it. Next Glen pointed out a windmill tower flashing by my right wing. Immediately the ground was lost to sight and we were in serious trouble. Praying that the wing-tip wouldn't catch the ground and that we would miss the windmill, I did a fast 180 and, just as we straightened out, broke out of the overcast, still barely above the ground and badly scared, determined to return to Grand Island. The overcast was no longer trifling, though and within ten miles again lowered and swallowed us. Once again a frantic ground-level 180 proved successful and we broke clear, a cornfield beneath us. Too shaken to continue and unable to see because of the windshield being coated with ice, we had no choice but to attempt a landing. In order to see I side-slipped into the field, straightening just before we touched the snow, which seized the wheels and pulled us to a stop.

We found ourselves within a few hundred yards of a farmer's home, and taking advantage of his splendid hospitality determined to sit tight until the weather cleared to a respectable degree. We were forced to stay overnight but the day after Christmas the overcast was gone. Now, though, we found the snow too deep to allow the plane to get up to flying speed, so after taxiing back and forth several times on the field, Glen and our luggage left us and the plane finally broke free. Our host drove my brother to Grand Island to meet the plane.

After our experiences we decided to return to Denver as fast as we could, and never since that time have either of us been able to fly with a comfortable feeling on a cloudy day.

D. J. KARMANN

Billings, Mont.

FIRE WATCH

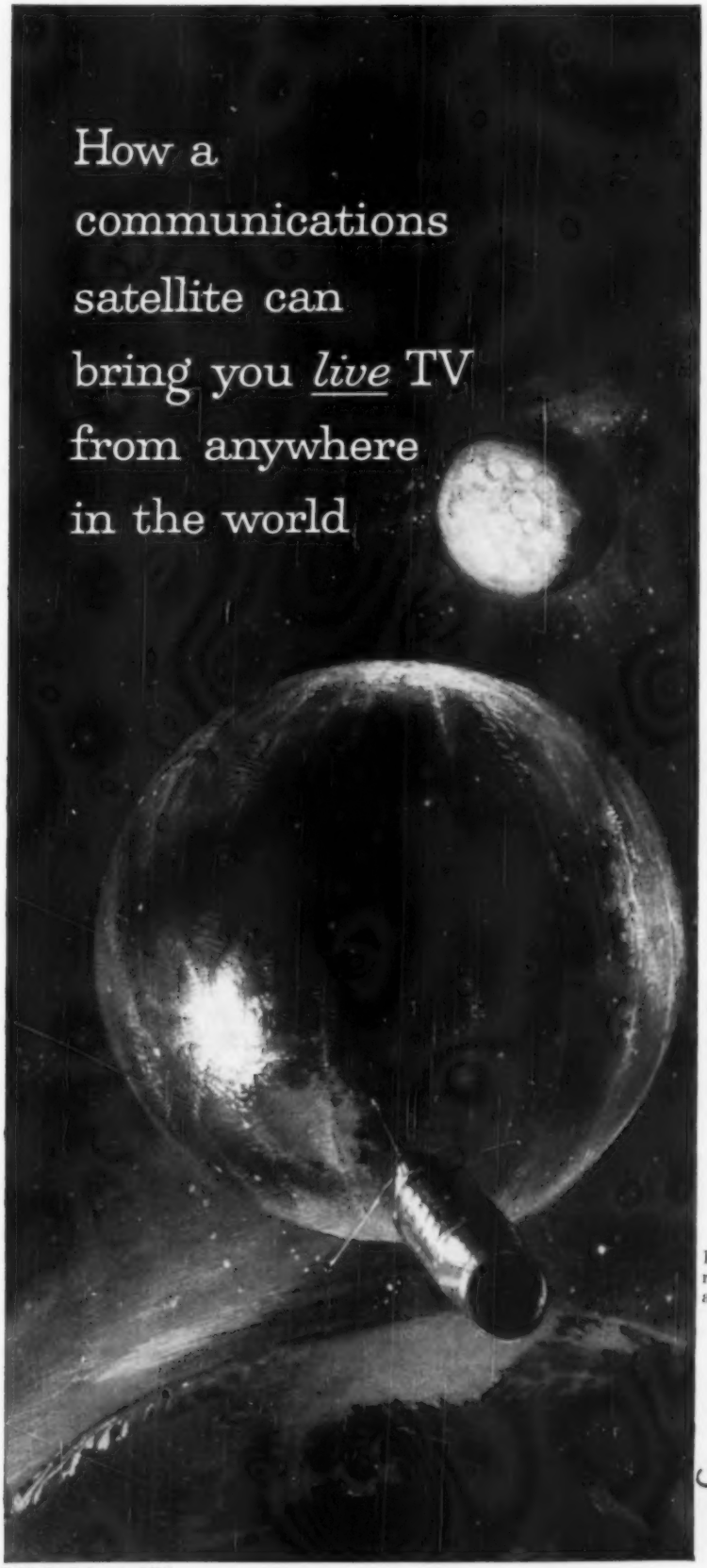
A PILOT in a lightplane had been practicing maneuvers near the town of Canaan, Vt. Completing them, he relaxed and took in the scenic beauty of the country below. All seemed contentment. Then he spied something that alerted all his senses. It looked like a house afire on a back road, off the main highway. He dropped down closer for a better look and, sure enough, a small fire was burning right against the back of a dwelling threatening any minute to burst into a full-fledged conflagration. The pilot hastily dived for the nearest large field, landed and 'phoned in an alarm. The fire department was soon on the scene and the blaze was extinguished with very little damage.

Said the farmer: "I'd like to know how you folks found out about the fire? No cars passed, no one has called." The firemen said nothing, but I knew because I was the pilot.

KEN FRIZZELL

East Concord, Vt.

How a communications satellite can bring you *live* TV from anywhere in the world



World-wide live TV, with no cable or radio relay costs, can develop from outer-space research by government and industry

Among the peaceful applications for scientific break-throughs being made in the study of outer space is a communications satellite.

Using inflated plastic satellites, boosted toward orbit by the Air Force *Thor* rocket, a global TV network could be established. TV signals would bounce to satellite and back to your station, giving you a front-row seat at events anywhere in the world. Cost should be a fraction of coaxial cables and microwave relays now used.

Practicality of *Thor* for this purpose is based on its demonstrated reliability. With Douglas responsible for airframe fabrication and assembly and test of the entire system, *Thor* has helped launch 84% of all payload weight put into space by the U. S.; is the key booster in the Air Force "Discoverer" firings; launched the first nose cone recovered at ICBM range.

Thor is another product of the imagination, experience and skills which Douglas has gained in nearly 20 years of missile development.

Foil-covered satellite, folded like a pocket raincoat, would balloon out in orbit as an inexpensive TV relay station

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Air Surgeon

(Continued from page 37)

accidents. Such accidents and incidents must be studied and evaluated with respect to medical factors involved. In the investigation of individual aircraft accidents, an FAA medical officer or other designated medical investigator will attempt to determine if pre-existing disease or physical defect may have been the primary or contributing cause.

Perhaps of even greater importance is the assistance which can be given by an experienced medical investigator, working with the other members of the investigating team, in reconstructing and interpreting the significance of events as they occurred prior to and during the course of an accident.

The on-the-scene medical investigation of aircraft accidents is only a part of the over-all medical study, of course. Also important is the investigation of the medical status of the aircrew, insofar as this can be determined, prior to the accident, and the post-accident assessment of those who survive.

The Medical Certification Division provides for the examination of all civil airmen and the administration of applicable rules and procedures in determining the physical fitness of airman applicants. To assist with the work of this Division there are approximately 2,000 designated medical examiners located in the United States and in foreign countries and a Regional Flight Surgeon's Office in each of five regional FAA offices. Examining physicians render a report of their medical examinations of airmen to the Medical Certification Division in Washington and issue certificates to qualified applicants.

Following a review of the medical reports in Washington further actions required because of the existence of some medical defect or suspected defect are initiated by Regional Flight Surgeons. In the administration of the established rules, decisions concerning qualification are made on the basis of the applicant's ability to demonstrate that he can fly safely under usual and emergency situations. In this connection, there are many pilots now actively flying with varieties of physical defects for which they have shown the ability to compensate while performing safely. Although special flight tests and practical tests are applied liberally in making determinations concerning individual applicants' abilities to fly safely, there are selected medical conditions in which no amount of medical evaluation or practical testing could determine, in advance, the occurrence of sudden incapacity frequently associated with these conditions.

In these instances, until more specific and accurate prognostic techniques are developed, reliance must be placed on the over-all knowledge pertaining to these conditions from the standpoint of administering the certification program. As a consequence, certain selected medical conditions are automatically cause for denial of a medical certificate.

The Review and Records Control Branch of this Division conducts a detailed review of the approximately 230,000 reports of medical examination received from airman applicants each year. These medical examination reports are kept on file in this Branch and special tabulations are made with respect to the types of medical deficiencies present in the civil airman population. This mass of data is used by the Standards Evaluation Branch of the Medical Standards Division in correlation studies to determine the effect of these deficiencies on the performance of airmen.

The central review, within this Branch, of applications for airman medical certificates insures the consistency of decisions in individual cases. When it is determined that some appropriate action must be taken, either for the purpose of gathering additional information, the performance of a flight or practical test, or the denial of a medical certificate, the medical file for the involved airman is referred to the appropriate Regional Flight Surgeon, who takes necessary action.

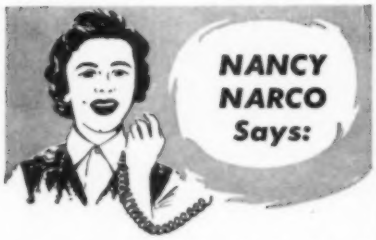
MAJ. GEN. MARCUS F. COOPER

Assistant Administrator for Plans and Requirements, FAA, he is one of the few Air Force Generals to engage actively in private flying on his own.

Where a medical deficiency causes the airman to fail to meet all of the requirements for a medical certificate, appropriate action is taken. Medical certificates are frequently issued bearing certain limitations. For example, an airman who is unable to recognize aviation signal lights may be certified to exercise all the privileges of an airman except for those requiring night flight or flight by signal light control.

The Clinical Examination Branch of the Medical Certification Division provides a well-equipped and staffed examining facility in Washington for the purpose of examining, without charge, those airmen who have been found to have medical deficiencies requiring specific medical evaluation before a final decision can be made concerning their qualifications. A similar examining facility has been established

(Continued on page 78)



I got my ears pinned back when I mentioned several months ago that a lot of pilots use Omni "half-heartedly." Couple of people wrote in that they didn't find their Omni receivers dependable enough to rely completely on them.

I am sure most people would agree that these are isolated cases, but it does bring up the matter of what performance to expect from electronic equipment and how you can be sure of continuing good, reliable performance.

First it will help to understand the "habits" of electronic equipment. Despite the most careful manufacturing and installation procedures, a small percentage of any production run of aircraft radio will probably need servicing or adjustment after installation. Most of these service problems show up in the first 25 to 50 hours of use and might involve a new tube and minor readjustment or "peaking up." After that it's usually clear sailing. The Narco people have taken two major steps to assure the high degree of satisfactory performance enjoyed by Narco users.

To prevent "shake-down" problems, they subject components and finished units to severe testing. Critical tubes are "burned in" for 48 hours so that many tube failures occur in the factory instead of in the airplane. They put each completed unit on a vibration table which shakes the living daylights out of it while at the same time, inspectors test performance and accuracy of the equipment.

Second, they've "extended the factory" to over *200* warranty service agencies where radios, during the warranty period, are given free service. A Narco purchaser can go to any of these warranty service agencies, whether on a trip or at home, and have his equipment checked and serviced "on the house" during the warranty period.

For continuing good performance of your equipment, it is well to give your radio a "home". Pick a good, reliable aircraft radio service organization and let them keep a watchful eye on your equipment. Like your family doctor, their continuing knowledge of your equipment's past maladies and symptoms will enable them to handle your servicing more efficiently and economically.

In the meantime, be alert for symptoms of deteriorating performance. Diminishing transmitter power, increased hash in the receiver, decreasing Omni accuracy are indications that a tube is getting weak or some other component should be replaced.

Regards,

Nancy

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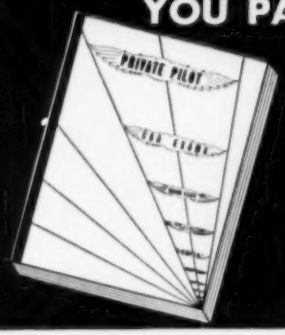

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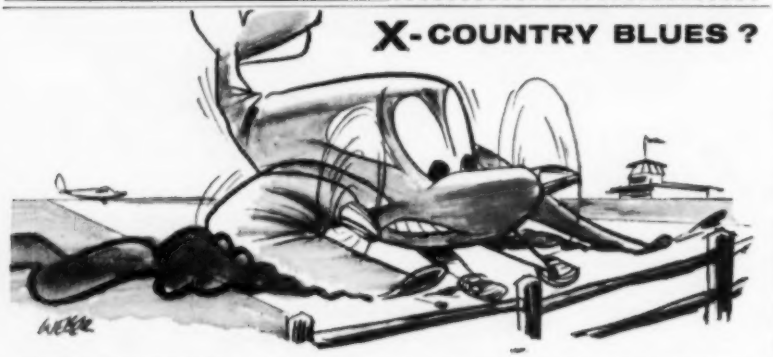

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(Continued from page 76)

at the Aeronautical Center in Oklahoma City and at the Regional Flight Surgeon's Office in Los Angeles.

These examinations supplement those performed by the individual's private physicians and specialists where such supplementation is needed prior to rendering a decision. In some instances, because of the nature of the medical deficiency under consideration, the applicant may be requested to return to the FAA examining facility at periodic intervals so that it can be determined under what circumstances his certification can be continued.

The Examiner Training and Control Branch of the Medical Certification Division has been established for the purpose of providing criteria for the selection of designated medical examiners, their supervision and training.

Until the establishment of the Office of the Civil Air Surgeon, however, there were insufficient staffing and resources available for the development of a comprehensive program in this area. Highest priority has been given to the development and administration of specific training programs for designated examiners for the purpose of presenting to them the medical concepts considered to be of vital importance in the performance of their work and the administrative practices which are a necessary part of the consistent application of medical standards in the selection of civil airmen.

Equal attention is being paid to the identification of those examiners who, for various reasons, have performed at less than the desired level of competence. The status of such individuals will be re-evaluated and appropriate action will be initiated. Since medical examiners are the first line of contact with airman applicants, it is hoped that the quality of all examiners can be maintained at a sufficient level and that their contacts with airmen can be established in a manner which will establish medical examiners as the medical advisors to airmen to whom all medical matters can be taken with the assurance that sound advice and assistance will be given and that fair treatment will be rendered.

The Environmental Health Division will identify and correct, or propose means of correction to the Bureau or Office concerned, the hazards to health and safety in aircraft operations. It also serves as the central reference point on the medical aspects of environmental factors of aircraft operations, advises concerning aircraft design, air and ground equipment, airport design to prevent or eliminate environmental hazards, establishes procedures and supervises the administration of them in providing certain emergency medical services to employees of the Agency as well as initial and periodic physical examinations for selected Agency personnel.

The functions of this Division are now in the process of implementation. The Employee Health Branch of this Division will administer a program for the provision of emergency health services to Agency personnel both in Washington and

(Continued on page 80)

For a 14" x 10" lithographic print, suitable for framing, write Aviation Division . . . Request Historical Series #3.

May, 1918 . . . Belgian Ace, Willy Coppens, collides with a balloon in his Hanriot.

Early War Birds— THE HANRIOT HD-1

Although of French design, this World War I scout was flown almost exclusively by the Belgians and Italians. Powered by a 110-h.p. Le Rhône rotary engine, the Hanriot HD-1 had a top speed near 105 m.p.h., an initial rate of climb of approximately 1000 feet per minute to 10,000 feet, and an endurance of 2½ hours. Highly maneuverable, stable, and "a real pleasure to fly", the HD-1 was armed with a single machine gun synchronized to fire through the propeller.

A successful exponent of the Hanriot was the Belgian, Major Willy Coppens, with 36 accredited victories . . . 25 of these over the "hard to get" observation balloon. His fourth victory stands out as one of the more remarkable air engagements of the War.

On the morning of May 15, 1918, Willy Coppens attacked a German balloon out of the sun. He fired three times at point-blank range without effect. Slowing down and flying even closer, he fired a fourth time when the balloon suddenly shot skyward and collided with his Hanriot. The wheels struck first and the plane tipped forward on top of the balloon. With great presence of mind, Coppens killed the engine. The HD-1 and the balloon began to sink, with the plane slithering across the spongy surface. The plane finally fell free, picking up speed in a dive. When Coppens released the engine cut-off switch, the engine started. He scooted for home with the balloon falling in flames behind him.

On his final victory over a balloon in October, 1918, Willy Coppens' leg was shattered by an incendiary bullet. In spite of the seriousness of his wound, he manag d to fly his Hanriot back to the Allied lines and land safely before fainting. When he was discharged from the hospital, the War was over.

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(Continued from page 78)

in the field. A major segment of this program involves an evaluation of the working conditions of air traffic control specialists and the establishment of effective industrial health practices within the Aeronautical Center at Oklahoma City. This Branch will not provide medical care, per se, but will be concerned with those health services authorized under Public Law 658. The integration of the control of military air traffic into the Agency's functions imposes considerable responsibility on the Office of the Civil Air Surgeon for the maintenance of the health of the highly skilled personnel who will be required to man the many widely scattered stations necessary to provide the continuity of air traffic control services in peace and in war.

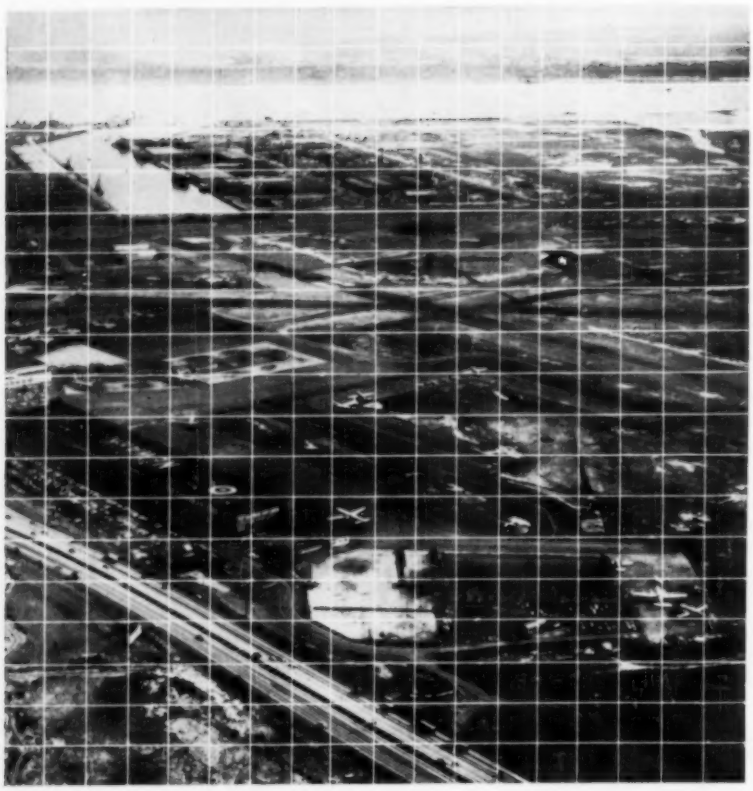
The Aviation Hygiene Branch will be concerned with the environmental factors which affect the safety and health of passengers and aircrew as well as those dealing with associated ground operations. Studies and recommendations will be made with respect to the design of aircraft and its equipment when this is significant to the comfort and safety of passengers.

The extensive use of aircraft in crop dusting and spraying operations has brought increasing numbers of pilots into close contact with highly potent and biologically active chemicals which have the potential of seriously affecting the health as well as the performance of pilots. Means of disseminating information concerning these hazards and procedures for ensuring the maximum protection against them are being developed.

The Civil Aeromedical Research Center at the Agency's Aeronautical Center in Oklahoma City is currently in a state of initial development. There will be, basically, three major functions performed by the Research Center, the most extensive of which will be the basic research function. In addition, there will be a clinical examination function comparable to that of the Clinical Examination Branch of the Medical Certification Division located in Washington and the clinical examination facility located in Los Angeles.

The research functions will include three identifiable areas of research, organized into branches. These are the Biophysics Branch, the Physiology Branch and the Psychology Branch. The basic research work conducted by these branches will be limited to those areas of research with a direct relationship to the field of aviation medicine wherein human factors are involved.

Inquiries and studies will be made in areas such as (1) survival equipment and procedures, (2) hearing and vision, (3) the effect of body configuration and size on the design of aircraft and equipment, (4) pilot aging and the effects of stress, (5) respiratory physiology, (6) cardiovascular physiology, (7) the effects of toxicological agents (including radiation hazards), (8) human factors elements of communications, (9) psychoacoustics, (10) physiological psychology, and (11) psychological factors in selection, performance and adaptability to changing environments. END



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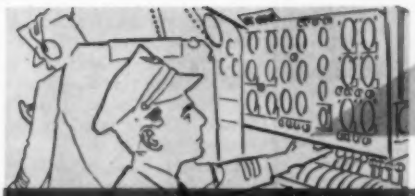

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Beech Queen Air

(Continued from page 50)

just right. Both pilot and copilot have a complete set of flight instruments. Engine instruments are located in the upper center of the panel for easy reading by both pilots. Radio and radar are installed in the center, which is a real boon to us older pilots who have finally bowed to bifocals. There's enough space in this panel for almost any kind and combination of radio.

The only overhead installation in this cockpit are six rheostats controlling a very complete network of lighting including map, sub-panel, fuel panel, cockpit red and flight and engine instruments. Numerous combinations and intensities are available to suit any situation. Although there was no opportunity to check the plane at night, I don't believe any Queen pilot is going to complain about cockpit lighting.

Handy to each pilot are the trim controls for elevator, rudder and aileron located in the lower part of the center pedestal. Just above, in their conventional place are the engine controls. But as you gaze at them for the first time, you'll "wonder where the yellow went" . . . better known as mixture controls. For there are none on this airplane. Proper mixture control is automatic and is preset at the factory for the life of the engine.

There's only one operation that the pilot can take care of in regard to fuel mixture. Just back of the throttles are two small toggle switches. If, in a steep climb at higher altitudes, the head temperatures should begin to indicate higher than normal, switch the toggles on. It richens the mixture to give a cooling effect. And if you forget to switch them off, they'll do it automatically as soon as throttles are retarded. Incidentally, there are no cowl flaps to fool with on this airplane. Augmentor tubes take care of the cooling.

If you've ever flown the Twin Bonanza you undoubtedly thought the visibility was good. But "you ain't seen nothin' yet" till you sit in the front end of a Queen Air. The sharper slope of the nose makes it appear that you can look almost straight down over the nose. The side view is unexcelled. And, with the compartment door open, one can look far back to the right through the cabin windows. Dual windshield wipers are standard equipment and alcohol anti-icing is available.

Engine starting procedures are normal and easy. If, by this time, you think there are no more surprises, think again. When those 340-hp Lycoming IGSO-480-A1A6 fuel injected supercharged engines fire up, they're so quiet and vibration free that you almost feel compelled to check the tachometer to be sure they're really running. These engines are very responsive to the throttles, and therefore must be handled gently.

Beech has designed a tricky little safeguard into their magneto switch system. The mags cannot be turned on until the battery key is on. Likewise the mags cannot be turned off till the key is in

(Continued on page 84)

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(Continued from page 82)

the off position.

After obtaining clearance from the Beech tower, we taxied to the end of the runway, checked out the mags and props, double checked with Marvin to be sure that nothing had been overlooked, and wheeled out on the runway. Fortunately, Marvin had warned me about throttle use on the take-off. I had almost forgotten what a supercharged engine will pull at only 1,400 feet elevation. These 340-hp Lycomings will produce between 55 and 60 inches of manifold pressure. That is, they will momentarily. After that, rods, pistons, valves and other assorted engine parts start flying all over the place.

The engines are restricted to 48 inches of MP for take-off. To make it easy, Marvin suggested using 43 inches. After the gear starts up, the rpm can be reduced to 3,200, bringing the boost up to 45 inches which is maximum for continuous operation. It's a simple easy way to handle the situation—easy on the engines, too, when conditions don't call for full power.

Take-off is a cinch with the tricycle gear. You just wait to see 75 on the airspeed and lift the nosewheel. At about 85 the Queen flies off and, by the time the gear starts up, the airspeed is past 95 which is minimum single engine control speed. Leave the nose down and in a very few seconds there is a good safe margin of speed for easy controllability in case an engine goes bad.

When everything was trimmed up, Marvin suggested 40 inches and 3,000 rpm to give us about 80 per cent power. With an indicated airspeed of 150 mph, we climbed out at 800 fpm. Sitting there, reveling in the smoothness of the engines and the quietness, it suddenly dawns on you that you were so involved with the comfort and luxury of this airplane that the performance aspects have been forgotten. Just as suddenly, you know it's going to be good.

Since we were going to a nearby town for lunch, I leveled off at 4,500 feet and left the power setting at 80 per cent. In no time at all the plane stabilized at an IAS of 207 mph. With the outside temperature at 44 degrees my computer said our TAS (true airspeed) was 222 mph. A power reduction was then made to 65 per cent. The airspeed settled back and locked on 180 mph indicated. This figured out to 191 mph true, a very respectable traveling speed for this moderate, easy-on-the-engines power setting.

By lightplane standards, control pressures of the Queen are heavy at cruising speeds. However, it seems to me that they should be just as they are. Any lighter and it would be too easy to put undue stress on the structure due to sudden control movements. There is no hard work attached to it anyway, because the airplane is so stable that it takes only an occasional touch of the wheel to hold a good course. Incidentally, like the Bonanza, this is a wonderful aileron airplane. It makes beautiful and quite rapid turns with just this one control. I'd guess that the Queen pilots will get into the habit of doing most of their flying with ailerons alone. I just barely had time to get the above reactions when we were close to Hutchinson, Kan.

After a delicious lunch (stop in if you're in the area) we taxied out for take-off. Using the same power setting as in our first take-off, I clicked a stopwatch as we began to roll. Best rate of climb speed starts at 124 mph at sea level and drops off one mph for each 2,000 feet of altitude. I just set the airspeed on 120 mph and tried to hold it as close as possible. The rate of climb went right up to 1,500 fpm and stayed there all the way up to 8,500 feet. In five minutes and 55 seconds we had made our take-off run, cleaned up and climbed a full 7,000 feet. One thing I liked so much about this airplane was that maximum climb does not give an extreme nosehigh attitude as some airplanes do. On the Model 65 you will have reasonably good forward visi-

(Continued on page 86)

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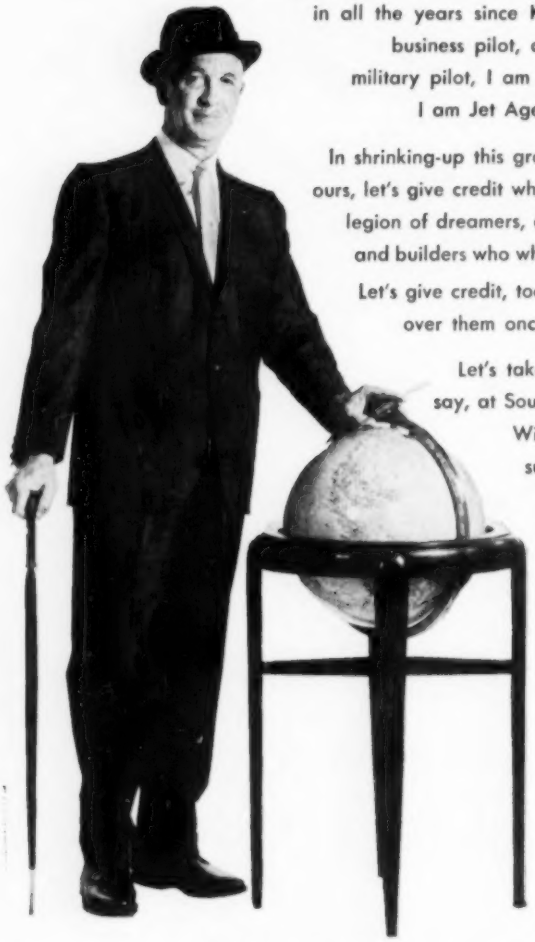

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(Continued from page 84)

bility in maximum climb attitude.

At 8,500 feet a 65 per cent power setting gave us an indicated 175 mph which trued out to 199 mph. Later in the flight we made some clocked runs just off the deck. At 2,000 feet we got an indicated speed of 180 and a clocked speed of just a few miles faster with the same 65 per cent power. In every case I seemed to be right on the button with the performance charts.

Stalls were normal in every way. Good buffet warning and easy recovery. However, don't forget this is a heavy airplane. After letting the nose down, don't come back on the elevators too fast. I was able to activate the stall warning horn eight to ten miles an hour above its normal warning speed. And I thought I was leveling out gently.

To check single engine handling, I put the ship into landing configuration—gear down and full flaps—and set up 100 mph, a good final approach speed. I then assumed a go 'round and advanced the throttles to full take-off power. This was immediately followed by retarding a throttle to full idle. It seems to me this is the worst possible condition that could confront a pilot, and one of the less likely ones. But if you can get out of a situation like this you ought to be able to get out of any. At this low speed and high horsepower there was a severe swerve toward the dead engine. Even though expecting it, the ship yawed some 15 to 25 degrees before I had it stopped.

As I reached for the gear handle, the dead engine wing started down. In a situation like this you have several choices. Throw in full aileron and rudder to stop the roll. This has the disadvantage of increasing drag and slowing your airspeed, already dangerously close to minimum single engine control speed. You can reduce power on the good engine to a point where you can control the asymmetric power. This, of course, makes you settle faster but at least you can stay right side up. Or you can drop the nose to pick up enough additional speed to keep control. I chose the latter. By then the gear was practically up and I started milking up the flaps. Normally, I believe, feathering should take place before you start work on the flaps. However, I was curious as to the performance with the prop in a windmilling condition.

With everything stabilized and maintaining level flight, I checked the altimeter. I had lost just 130 feet from the time the go 'round had started and the airspeed was indicating 130 mph. Pressure on the rudder was considerable. We then feathered the prop. Airspeed picked up to 140 mph and pressure on the rudder lessened some but was still too much to hold for very long. Normally you would trim out this load with the rudder trim tab. All this took place at 6,500 feet above sea level.

Although not as easy to handle in a single engine emergency as some of the light twins, the Travelair for example, the Queen is not what I would consider difficult. It's only natural that with more speed, more power and a heavier airplane

(Continued on page 88)

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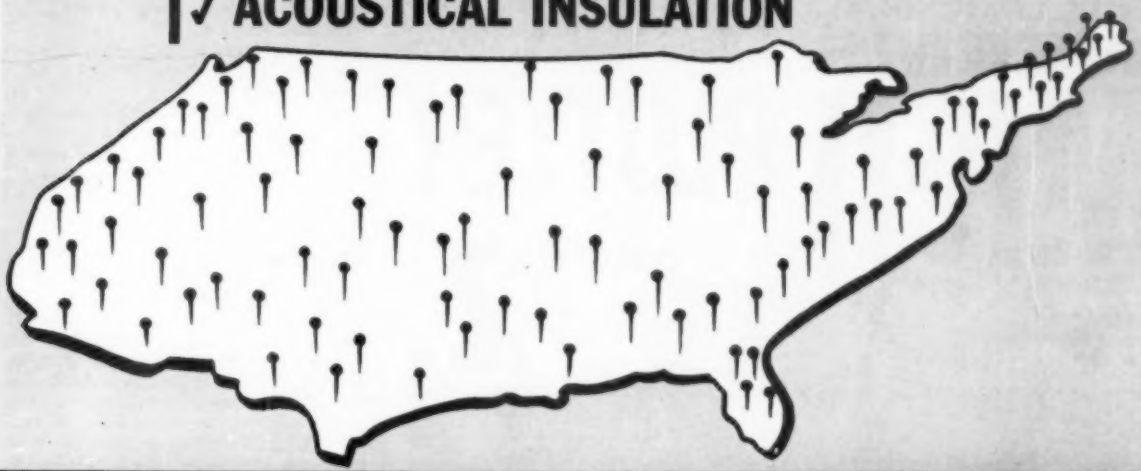

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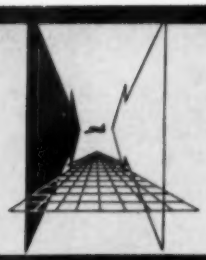

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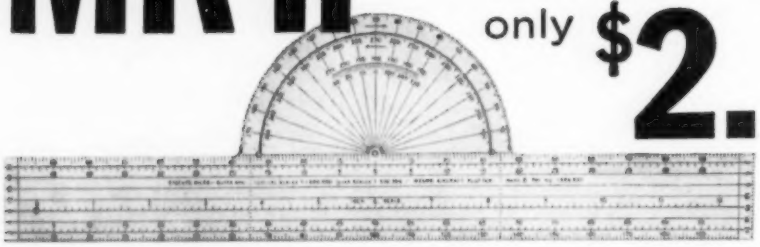

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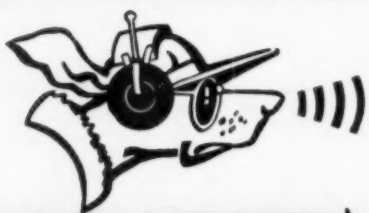

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(Continued from page 86)

you're going to have to be sharper to stay ahead of the ship under all conditions.

Landings were almost laughingly easy. The only difference from the lighter twins is that with the heavier elevator forces you'll find yourself depending much more on the trim tab. This is nothing new to pilots familiar with heavier aircraft but may "throw" those who fly only lighter craft.

Performance figures have purposely been avoided up to this point for the simple reason that there are a large number of performance figures. Business men pilots are accustomed to thinking of a single set of figures. Most of these are predicated on gross load. Though lighter loads will improve the figures to some extent, many lightplane pilots fail to think in these terms.

But with the Queen Air you are dealing in flight weights that may vary from 6,000 pounds to maximum gross of 7,700 pounds. They do make a significant difference. Here are some of the figures.

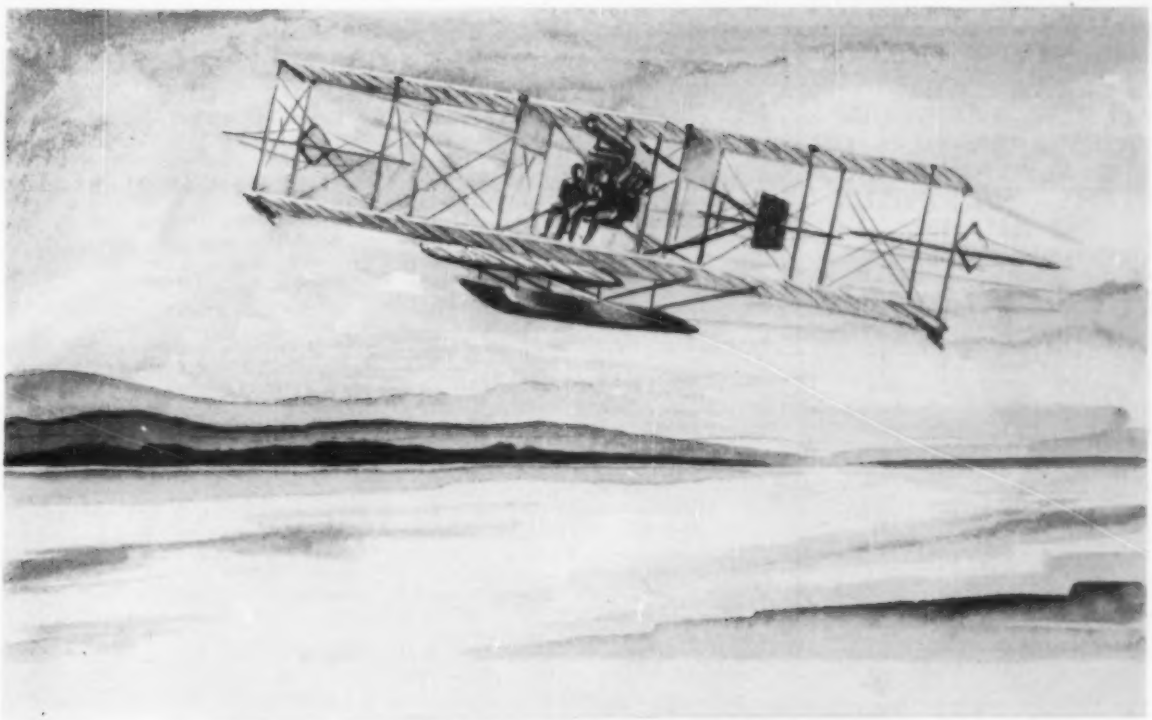
Rate of climb at sea level will vary from 1,920 fpm at 6,000 pounds to 1,300 fpm at 7,700 pounds. At 12,000 feet you are still getting 1,740 fpm at the lighter load and 1,120 fpm at gross.

With one engine feathered at sea level, the climb is 180 fpm at 7,700 pounds—490 fpm with a 6,000-pound load. At 12,000, climb is reduced to 50 fpm and 395 fpm. This performance is predicated on best climb speed which varies from 117 mph to 108 mph depending on altitude. Temperatures, of course, play a big role in all these performance figures.

Speeds range from a top of 239 (which can be reached at altitudes of 15,000 to 20,000 feet) to a low 126 mph at 5,000 feet for a maximum endurance of 11.2 hours. Or they can range from 145 mph pulling only 40 per cent power to 215 mph, using 70 per cent power. Mileage-wise ranges vary from 1,200 to over 1,600 miles depending on altitude and per cent of power used. These are only a few of the figures available to the pilot of the Queen Air.

While the Queen Air is not a difficult airplane to fly (I'd classify it as easy), I don't believe it is an airplane for the casual businessman pilot. It should take considerable checking out to become familiar with all the systems and procedures for various conditions and situations. And as can be seen from the above figures, it's going to take a lot of handbook and chart study in order to get the most out of this highly flexible airplane. This is a job for the professional pilot. And that's as it should be. For, anyone who has $120,000 to lay down for a bare airplane is the kind who will want a professional. Incidentally, N11OQ as she stood with radio, radar, oxygen system and other accessories was approximately $171,000.

Believe me, I was hard pressed to find anything in this airplane to criticize. I finally picked on the wheel. It was a skimpy, cheap-looking piece of equipment for a lady like the Queen Air. There were indications that it had caused some factory discussion so perhaps it will be changed and the plane will be perfect when you see the production models. END



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The Hazards of Ice

(Continued from page 46)

both types form and the resultant ice is of milky appearance, partly crystalline and partly non-crystalline. A rule of thumb for this situation is that when temperatures are just slightly below freezing, clear ice predominates, but at lower temperatures rime ice forms; between the two extremes, the ice actually is a mixture of both, one or the other predominating depending upon air temperature. Certain clouds offer more icing hazards than others. Cumulus clouds lead the parade of offenders because their vertical currents can support large and numerous droplets. Stratocumulus clouds are not as serious a threat unless they are dense and cold.

Clouds formed by winds blowing uphill are as serious a hazard as the cumulus type since the vertical currents can be quite strong and carry quantities of large droplets. Normally stratus clouds are mild offenders because water droplets are smaller in size.

Several years ago, the then NACA had a specially equipped airplane flying in the Washington-Oregon area to probe some of the icing problems. Group leader Lewis Rodert, who flew the plane, made the observation that "by experience we have learned that the severest ice was found in the center of the cloud which looked the blackest."

Another tip passed on by experienced pilots is that regions of freezing rain or drizzle are by far the most hazardous. The amount of water below freezing temperatures encountered by an aircraft flying through such a region is often sufficient to build up a layer of ice several inches thick in less than 30 minutes.

What can be done if ice begins to form? Corrective action will depend, of course, upon circumstances and what alternate choices are available to the pilot. Here are several suggestions:

VFR, aircraft without deicing equipment—At the very first indication of external ice, attempt to locate an altitude where ice is less likely. By referring to the outside air temperature gauge, either let down to a lower level or climb to a higher altitude—to find an OAT above 32 degrees F. or a considerably colder one, about 15 to 20 degrees F.

Or increase vertical and horizontal distance from clouds; head for the area under clear sky if the cloud condition is broken to scattered.

Or turn back out of the icing area; land at the closest airport if minutes away.

IFR, aircraft without deicing equipment—Request another altitude where icing conditions are less likely (see Fig. 1). If possible, request clearance to a level where the air temperature is above 32 degrees F. or to an altitude above the overcast. If this is not possible, try for an altitude where the OAT is lower than 15 to 20 degrees F.; here, icing conditions are less likely to occur, except when flying through a cumulus or cumulonimbus cloud.

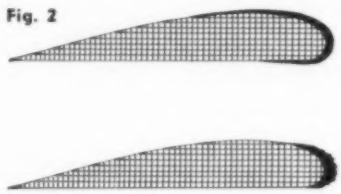
Should the icing problems continue to exist, and increase dangerously, then the pilot should declare an emergency.

IFR, aircraft with deicing equipment—Most pilots agree that the anti-icing devices on light twins assist in meeting an emergency but are not designed to prepare the aircraft for deliberate flight into icing conditions. If severe icing conditions are inadvertently encountered, experienced pilots turn back or land at an alternate airport.

When encountering light to moderate ice, the rubber deicers on the leading edge of the wing and tail are usually effective. By flicking a switch, the "boots" are alternately inflated and deflated, and ice is cracked and broken by the changing shape. The wind then blows away the fragments of ice.

For propeller protection against ice a chemical method involving alcohol is most commonly used. This anti-freeze is released onto the propeller blades by a spinner slinger ring. The flow of alcohol over the blade is directed by a feed shoe, a rubber pad covering the leading edge.

Fig. 2



Top: Clear ice is transparent or translucent, having a glassy appearance. Bottom: Rime ice appears as a rough deposit of white granules.

Grooves in this pad distribute the alcohol to critical areas on the blades.

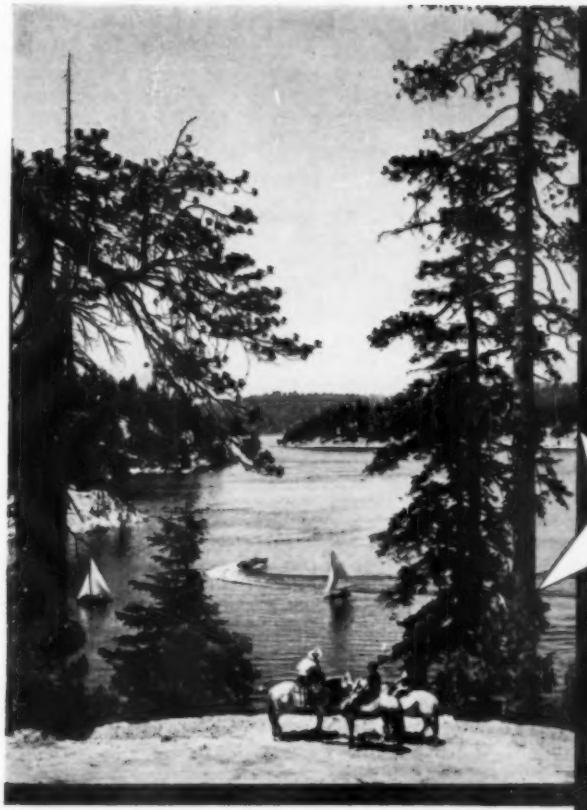
Though equipped with deicer boots and alcohol anti-freeze protection for the propellers, a pilot should nevertheless watch the icing condition very closely. If he observes that the aircraft is about to pick up more ice than the deicing systems can handle, he should resort to the first basic rule of requesting another altitude. (Refer to Fig. 1 and suggestions for IFR flight without deicing equipment.)

It should be remembered that a pilot can expect faster ice accretion rates in convection type clouds such as stratocumulus, cumulus and cumulonimbus. Lesser ice accumulation is found in stratified clouds such as stratus and altostratus.

Associated with the problem of external ice there is another one: carburetor icing. Actually the pilot should be conscious of this type of icing long before entering wing icing conditions.

Of the three basic types of fuel systems, the float-type carburetor, the pressure-type carburetor, and the direct fuel injection, the first type mentioned is the most susceptible to attack by ice. In the float-type carburetor evaporation of fuel to creat an air/fuel mixture occurs above the butterfly valve in the narrowest part of the venturi, and is accompanied by a

(Continued on page 92)



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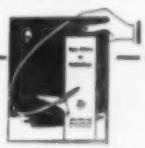

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(Continued from page 90)

sharp drop in temperature a normal process when volatile liquids evaporate. Rapid vaporization can result in a drop of more than 40 degrees F. which means that in the fall and winter the temperature within the carburetor is almost always below freezing.

With such low temperatures present in the throat, any moisture in the incoming air will condense immediately and ice will begin to build up on and around the butterfly valve. If a sufficient amount of ice is allowed to form, it will clog the throat, build up in the induction system, and stop the fuel supply.

However, the effects of the carburetor ice can be minimized if the pilot is ice conscious and applies carburetor heat as needed to remove ice or prevent the condition from developing.

Less susceptible than the float-type, the pressure-type carburetor nevertheless can develop the ice menace. In this type carburetor, fuel is evaporated beyond the venturi, the point where carburetor ice usually forms due to fuel vaporization and temperature drop. However, under heavy icing conditions, ice can form in the manifold riser and restrict fuel mixture supply to the engine. This type of carburetor is provided with a heat source to combat formation of internal ice.

With the third fuel mixture system, direct fuel injection, fuel evaporation takes place where there is plenty of heat to maintain temperatures above freezing. But there still remains the possibility of ice forming in the air intake system. To handle this situation, aircraft such as the Cessna 310-C have provisions to introduce heated air into the air induction system to melt any ice which might form and tend to restrict the air flow.

So it can be seen that, regardless of the type of fuel mixture system installed on the airplane, the pilot must be alert to "invisible" ice which can form in the carburetor or air induction system—as evidenced by a drop in manifold pressure, or a rough-running engine, missing and backfiring.

In addition, ice can form on the windshield and seriously restrict forward visibility, or build up on the pitot tube giving false air speed, altitude and rate of climb readings due to clogged static source. Heated pitot will cure the problem but it is nevertheless possible for the "run back" from a heated tube to freeze and cause ice formation that can adversely affect air flow of the pitot and static pressure systems.

Recently the Bureau of Flight Standards of the FAA has issued a bulletin entitled, Release No. 43 — Flight Control Hazards and Protection from Icing, which has some further pertinent facts on the icing problem.

In summing up this subject of external and internal ice encountered when flying during the winter months, it is obvious that careful flight planning and full use of weather information is essential for both the VFR and IFR pilot. To enjoy winter flying, remember to try to avoid icing conditions by keeping an eye on the outside air temperature gauge. END

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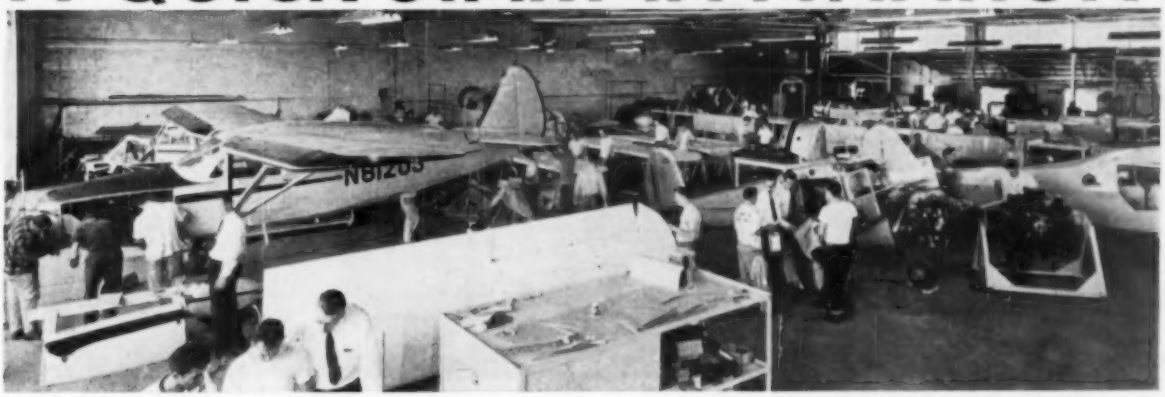

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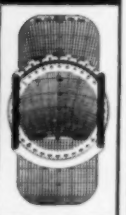

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Pine Needles Lodges & Country Club

Southern Pines, N. C.

SITUATED IN THE HEART of the "Winter Golf Center of the World," Pine Needles Lodges and Country Club is the place to tarry awhile, particularly if one is addicted to golf. The establishment consists of the main club house with attractive lounge and dining facilities. Six rustic lodges, on either side, provide living accommodations in a quiet peaceful environment. Some offer four regular bedrooms and one master bedroom; others four regular rooms and two masters, arranged to give one person, couples or larger groups complete privacy. All rates are American Plan, and range from $36-$40 per day, double; and $24-$27, single, on seasonal basis.

The adjacent Pine Needles golf course, designed by the late Donald Ross, for both high and low handicap player, is considered one of the country's sportiest and most challenging. Club guests receive preferred golf starting times, and special greens fee of $3 or $4.

Located a mile and a half from Pinehurst—Southern Pines Airport (Charlotte chart), transportation for the flying guest is provided by the Club's courtesy car. Pine Needles Lodges is owned and operated by Warren and Peggy Kirk Bell (Peggy Bell is a golf pro of nationwide fame). Both of them fly.

The airport has two excellent sod runways, the longest 5,800 feet. (Piedmont Airlines provides seasonal service here.) Facilities include rotating beacon, strip lighting, Unicom; administration building and aircraft storage, major and minor repairs. Gasoline available: 80/87, 91/96, 100/130 oct. L. C. McKenzie is manager.

Research and Development

(Continued from page 30)

FAA proving ground for all new techniques, procedures, and equipment. Situated in one of the busiest air traffic areas, it provides a "real life" environment for studies of air traffic control problems. Operating as a division of the Bureau of Research and Development, NAFEC is responsible for conducting comprehensive engineering and operational tests and evaluation of systems, equipment, and procedures proposed or intended for the national system of aviation facilities.

The research center is staffed by approximately 400 military and civil service employees, including engineers, pilots, laboratory technicians, draftsmen, mechanics and white-collar workers.

General purpose test equipment has been installed at NAFEC where experiments may be conducted and systems or concepts tested for over-all accuracy and performance. A major project is development of an Aerial Measurement System which will include the most modern sensing techniques and use of photo-optical electronic data collection, airborne

digital equipment, conventional airborne recorders, and telemetry.

A Phototheodolite Tracking System will be installed to determine the precise space-position-time track at low angles involved in approach, landing and taxiway operations. For longer ranges the Multiple Object Phase Tracking and Ranging System (MOPTAR) is designed to determine the space-position-time track of five aircraft simultaneously to a high degree of accuracy under all-weather conditions. This tracking system is part of an integrated Test Instrumentation System which includes space-position measurement instrumentation, airborne instrumentation, and data-processing facilities.

Typical of the projects now under investigation by Research and Development are those outlined below:

Data Processing Central Display

The keystone effort in the initial program to modernize air traffic control is the Data Processing Central Project. Its purpose is to provide for the development of semiautomatic air traffic control data processing and display system to replace the existing manual system used to control air traffic in all major high-density areas of the nation's airways. System concepts required for evolution of the existing manual system have been established and development of equipment items is proceeding rapidly.

Air Traffic Control Simulator

In 1958, a contract was awarded for construction of electronic air traffic control simulator equipment to be delivered beginning in June 1959. Under laboratory conditions this equipment can simulate a large number of airplanes in flight at predetermined speeds.

Initially it will be used to exercise the data-processing central equipment by providing aircraft position, voice communications, weather conditions, and other aircraft and aviation facilities information exactly as if it came from a real traffic control situation in the high-density New York area where the data-processing central equipment will be given its first operational test.

Runway Lighting

Competitive systems of narrow-gauge lighting are being tested by FAA in the touchdown area (first 2,000 feet) of runway at NAFEC. One system comprises the Elfaka-type flush runway lights arranged to form "barrettes" of three lights, each spaced at five-foot intervals transversely, every 100 feet along the runway. The transverse span between the inner lights of each pair of barrettes located on opposite sides of the runway centerline of "gauge" is 60 feet. This pattern is duplicated using MC-2 semiflush lights to compare effectiveness of the two methods.

Three additional lights have been

(Continued on page 96)

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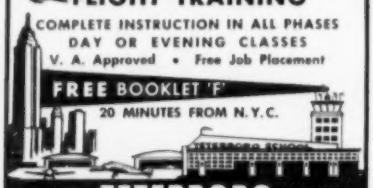

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(Continued from page 95)

added to each MC-2 barrette with the inner lights at a span of 35 feet. This will permit testing the comparative effectiveness of three-light barrettes at spans of 35 to 75 feet; also testing a six-light barrette with a span of 35 feet versus three-light barrettes at 35 and 65 feet.

"Pancake lights" constitute a service prototype development of the "button lights" innovation brought out by the University of California in connection with the highspeed runway exit project. These lights are being installed on the runway centerline, high-speed runway exit centerline, and several narrow-gauge barrette configurations at NAFEC for testing.

The contractor is building the production units with several improvements found desirable during the testing of sample lights submitted with the contract bids.

Automatic Ground-Air-Ground Communication System (AGACS)

In June, 1958, a contract was awarded to build test models of automatic ground-air-ground communication system (AGACS) for experimentation with the data-processing and display equipment now being developed for the New York Air Route Traffic Control Center. FAA expects that tests in this high-density area will be particularly valuable.

This experimental program calls for a mechanical communications system to handle routine communications between pilots and the data-handling system operated by human controllers on the ground. This will relieve congestion on voice channels, thus providing time for non-routine messages and emergency uses.

AHSR-1 Air Height Surveillance Radar (3-D Radar)

A contract has been awarded for the development of a radar antenna and receiving system of advanced design, adding the third dimension to the two-dimensional air traffic control radars now in use.

The antenna proposed by the contractor will be 150-160 feet high and will have neither moving elements nor electronic components other than waveguides within its physical structure. By receiving radar energy reflected from aircraft in one of a total of 125-135 multiple beams in the vertical dimension, the antenna will give accurate height information on these aircraft out to a range of 50 nautical miles.

This proposed radar antenna tower is a promising approach to the long-standing problem of giving the ground controller accurate information on the altitude of aircraft without using the usual method of radio-voice communications. Obviously, a system that would provide altitude of air traffic would relieve both the pilot and the ground controller of communications burden involved in the exchange of altitude information, thus affording the controller more time for decision making activities.

The Air Height Surveillance Radar (designated AHSR-1) is intended as a system to assure either a controller or a tracker-computer system that two air-

craft observed to be in close proximity on a conventional ATC Search Radar System are maintaining a safe vertical separation when crossing paths.

Simulation and Computer Laboratory

FAA's Simulation and Computer Laboratory was completed at NAFEC in May 1959. The purpose of the laboratory is to apply techniques of graphic and dynamic stimulation, both real and fast time, machine computation, and data reduction to the solution of problems in air traffic control and navigation from a systems analysis standpoint.

An Air Traffic Control dynamic simulator, moved from the Technical Development Center, Indianapolis, when it was closed, is being used on projects which are designed to effect immediate improvement in air traffic control problem areas. A more sophisticated ATC simulator will be installed in the next six months to provide a more advanced capability in air traffic control systems testing by simulation.

Comprehensive computer equipment is now operating and provides computation, data reduction and simulation capability for both fast-time and real-time experiments. Our newest and biggest computer, an IBM 709, is being directed toward urgent problems.

General Aviation Distance Measuring Equipment Interrogator (DME)

A low-cost, lightweight Airborne Distance Measuring Equipment unit is being developed under a contract awarded in April 1959. This equipment will permit executive and personal aircraft to use the distance feature of the VORTAC. Present equipment in use today is too heavy and expensive for the average aircraft owner.

The VORTAC is a dual-role airways aid—in effect, a very high frequency broadcasting station, transmitting simultaneously on VHF and UHF. The word is derived from the civil "VHF omnirange" and the military "Tactical Air Navigation."

A civilian pilot gets his directional information from the VOR station, and if his plane is also equipped with DME, he can get distance from the same VOR station. This distance figure will be shown on a meter-type dial. Thus, DME together with VOR makes it possible for the pilot to know his geographical position at all times.

Collision Prevention Advisory Group

The Collision Prevention Advisory Group, formed in April 1959, seeks suitable airborne collision prevention devices in a minimum amount of time through optimum use of funds, personnel, and facilities. Seven groups are represented: FAA, Army, Navy, Air Force, Air Transport Association, and the National Business Aircraft Association.

Taxiing and Routing of Aircraft

The purpose of TRACE (Taxiing and Routing of Aircraft Coordination Equipment) is to develop a system for safely expediting surface movements on the airport in order that this phase of the op-

(Continued on page 98)

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(Continued from page 97)

eration will not become a bottleneck.

The TRACE system consists of induction loops buried in the runway. These act to detect moving aircraft on taxiways and runways and then relay the position information to the control tower where it is displayed on a panel.

Using this information, the controller can give taxiing instruction to the pilot either by radiotelephone, as he does now, or perhaps at a later date through operation of signal lights located at appropriate points, particularly at intersections of the taxiways and runways. Another objective of the TRACE program is to reduce radiotelephone communications needs, thus relieving channel loading and reducing the controller's workload.

Aircraft Identification and Locating

Early in 1960, FAA is starting tests of radio doppler equipment as a possible method for determining position during approach and landing or departure. This technique can be used for identification and space-position determination of any aircraft without requiring the plane to carry extra equipment such as a transponder.

All Weather Landing

A two-phase program is in effect to (1) improve the existing Instrument Landing System (ILS) and Ground Controlled Approach (GCA) and (2) to press the development of new techniques for the traffic control environment we can expect in the future.

A directional localizer is in the process of final development and requires relatively minor improvements. Development of a directional glide slope instrument, which began under CAA sponsorship, shows great promise. In addition, the use of visual glide slope aids is being exploited to the fullest.

The REGAL system, developed by FAA, will be available for competitive testing this spring. Bell Landing System and the North American Landing System are under development and tests are planned to be underway early this year.

The goal of modernizing the federal airways is a difficult one. Time is of the essence and beyond the technical problems is the thorny one of designing a system to suit all users of the airways. FAA's Bureau of Research and Development is confident that it can solve the problems. END

24 Popular Ways

(Continued from page 55)

erator manufacturers in business and, in that way, do your part toward making our country more prosperous.

10. *Don't hang on to loose screws or bolts.* If you find a loose one, don't waste time checking where it came from. Save the weight and throw it away.

11. *Don't clean the windshield.* Dust accumulated will stop the glare, especially when landing into a sunset. It also eliminates bothersome specks which often appear enlarged as an intercepting aircraft. Knowing about a head-on collision beforehand could spoil your whole day!

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12. *Don't check the brake fluid.* What you don't know might not hurt you. Brake fluid is a costly item. Think of the money you can save! (Forget about the warping or scratching of the brake drums.)

13. *Don't check the hydraulic quantity.* The gear will probably free fall.

14. *Don't ignore the tires.* Be a tire kicker. Every time you walk by, kick them, and hard!

15. *Don't drain the gascolators.* The engine could very well burn the water and save you that trouble. It will make for a water injection take-off, assuming the aircraft gets off the ground.

About the operation of the aircraft, there are several tricks which can keep you up (or down) with Hotshot Jones:

16. *Don't make an outside check.* It is for the suspicious and often doesn't reveal anything. If it's bad weather out, ignore all such checks. Remember the old cigarette slogan, "Nature in the raw is seldom mild."

17. *Don't worry about overloading the aircraft.* "If she'll taxi, she'll fly" is a good adage to live and die by.

18. *Don't be a slowpoke in taxiing.* Make it fast downwind and slow upwind; then hard on the brakes, and sharp on the turns.

19. *Don't make runups on the taxiways.* Make them on gravel or dirt. Stones picked up nick the prop like notches on a gun. They are marks of hotshot pilots.

20. *Don't rely on mag checks.* If there is a drop below limits, allow an extra 25 rpm for every five years of flying.

21. *Don't hang on the controls after landing.* Let go of those controls, loosen the safety belt, and light a cigarette. (Just because there were 646 pilots in 1957 who had accidents because of letting go of controls on the ground, doesn't mean you have to be one.)

22. *Don't fuel after landing.* Wait until just before take-off. It will require less fuel as condensation takes up part of the room in the tank.)

23. *Don't cut the engine with the mixture control.* Cut the switches; it seems so neat. Makes a pretty warping job after a while, too.

24. *Don't worry about tie-down even if it is going to rain.* Tie the ropes as tight as you can, snugged hard! It *is* possible that the tie-down ropes will shrink and crack the wings or spars but it doesn't happen too often.

By this time, the old family aircraft should be ready for the scrap heap. If you do as others often do, assuming that you live through all of this, you'll buy a new one and start the cycle all over again. It's jolly fun!

There are some pilots, however, who are just spoil sports, not at all like Hotshot Jones. They want to keep their planes running smoothly, reduce maintenance bills, prolong the life of their aircraft, and keep the old lady from collecting insurance. They won't play ball with Hotshot.

If you are one of those hard-headed individuals, all of these tips are wasted. Chances are you faithfully change the oil, handle your plane as if it were a pet animal, and give it an overhaul when the recommended time is up. Well, to each his own. END

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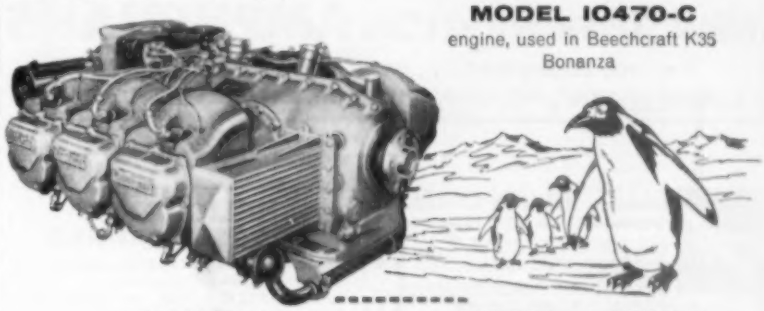

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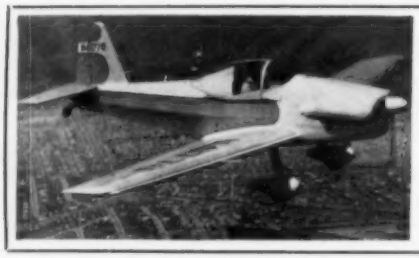

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Special Statement

(Continued from page 26)

ping centers, and the time may come when the shortsightedness of much of this will become evident.

Many communities are finding that industries looking for new locations view a good local airport in the same light as schools, ground transportation and water supplies, and give it serious consideration before coming to a decision. I think this is an area into which the private flying organizations should move, and quickly, before it is too late.

The average rate of increase in numbers of commercial and private pilots is expected to continue—740,000 in 1960; 794,000 in 1962; 872,000 in 1965. Agreements reached between the pilots and certain of the airlines calling for a qualified pilot as the third airman in the cockpit undoubtedly will swell the commercial ranks as will the greater sophistication of general aviation as a whole. This is an area which gives us great concern.

In the interests of safety the FAA recently proposed steps that will require many of these commercial and private pilots to become familiar with instrument techniques and the use of radio for communications and navigation in cross-country flying. The announcement was widely misinterpreted to mean that we were demanding that they qualify for instrument ratings which, of course, is not the case.

However, the number of fatal accidents in general aviation, resulting from the pilot's inability to cope with emergencies encountered en route clearly indicates the need for higher pilot qualifications and this we intend to enforce. We cannot compromise on safety.

Federal Aviation Agency business flying specialists are working with organizations and executive pilot groups encouraging them to institute training programs on their own, since half the number of airline transport pilots are engaged in general aviation, and many companies operate aircraft similar to those of the carriers. We have also instituted action to improve all flight training by establishing uniform standards to bring the whole picture into focus with modern flying practices.

The FAA is doing everything in its power to strengthen general aviation. We have firm confidence in its ability to help itself and to further its own interests within the framework of the safety regulations.

The present cycle of business expansion which began in the spring of 1958 is expected to carry the economy to new highs in 1960. END

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Flight Standards

(Continued from page 33)

of the Administrator, Notices to Airmen, new flight procedures or technical manuals.

This, then, is the system. In essence, it has three functions. (1) to set standards of safety. (2) to maintain a close watch to insure that these standards are being followed. (3) to investigate and initiate punitive action when the standards are violated.

Once a rule has been established, Flight Standards goes into action to assist industry in following it. The Bureau issues with each regulation an interpretive manual describing in more detail what it is seeking and how the rule can best be fulfilled. The examinations Division, for example, has written and published three pamphlets of elementary aviation knowledge to help student pilots. These three books—Realm of Flight, Path of Flight and Facts of Flight—soon became government best sellers. The division recently arranged with Navy to republish its All Weather Flight Manual to help pilots.

Enforcement of regulations is conducted by officers operating in FAA's district offices. The local officials also forward to the Bureau of Flight Standards a report on each incident, mishap and accident. These are studied and evaluated in Washington to determine if a CAR has been violated and what remedial action is necessary.

Add to this picture the ferment of American inventive genius and the new instruments, machines, and devices aviation turns out each year—hundreds of fresh products all demanding testing and certification. Add these all up and here is Flight Standards at work.

In fulfilling its total mission, Flight Standards last year:

- Administered 105,000 written examinations covering 35 areas of aviation knowledge.
- Logged 41,400 actual flying hours testing the accuracy of the more than 900 primary electronic aids to navigation.
- Issued more than 40 Special Civil Air Regulations involving approximately 200 individual changes.
- Continued its monitoring and spot checking the work of the industry's more than 100,000 mechanics working in nearly 700 repair stations.
- Issued and recorded 44,137 aircraft registration certificates and 86,511 airmen certificates and associated ratings.
- Participated in more than 12,000 semi-annual flight tests of the nation's airline pilots.
- Inspected, tested and approved, and certificated eight entirely new transport type planes, eight new types of helicopters, and 16 new types of personal aircraft.
- Issued 120 directives to correct deficiencies discovered during operating conditions.
- Reported and evaluated more than 2,000 violations of Civil Air Regulations.
- Investigated and evaluated over 3,000 aviation incidents, mishaps or accidents of aircraft under 12,500 pounds. END

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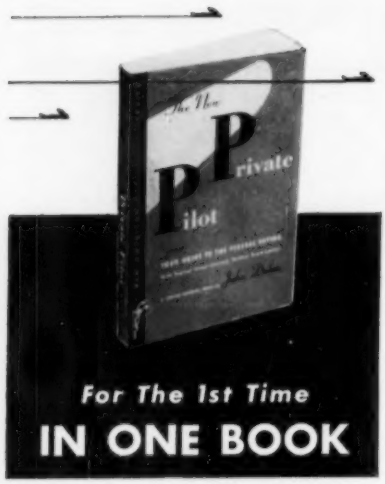

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Cessna 170-B

(Continued from page 53)

around it, the Continental doesn't need more than three to five minutes (under normal weather conditions) to come up to temperature for take-off.

Prior to take-off, and as part of the controls check, the trim tab pointer should be set to "Take-off Position," and the flaps operated through their full range. The flap handle is moved by depressing the thumb button and placing it at the desired flap setting. By releasing the thumb button, the handle can be locked to provide 0, 10, 20, 30 and 40-degree flap positions.

For shortest take-off, the second or 20-degree position provides maximum lift. Positions of 30 and 40-degrees produce drag and are used for slowing down the airplane and steepening the glide angle.

While running up the engine, magnetos are checked at 1,600 rpm. Maximum permissible rpm drop on either magneto is 100 rpm. A full throttle static check is optional, but not recommended by Cessna unless the pilot is flying the airplane for the first time, or believes something is amiss. At full throttle, the engine should run smoothly and churn up (with carburetor heat off) between 2,230 and 2,330 rpm. On the other end of the power curve the engine should idle between 300 to 400 rpm. Except for short checks, do not idle below 600 rpm, as satisfactory piston lubrication cannot be maintained at low idling speeds.

Take-off procedure for the 170-B is simple and easy. With carburetor heat off, full throttle is fed in and the four-place Cessna accelerates quickly if the pilot keeps his heels on the floor and avoids dragging the brakes. Maintaining a tail low attitude throughout the take-off run, the 170-B will fly itself off. Once airborne and after some speed has been attained, the airplane is climbed out at an indicated airspeed between 85 to 90 mph for the best rate of climb. If 20-degrees of flaps (second notch) are used for a minimum run take-off, the procedure is basically the same, with the following additions: Climb the airplane at 65 mph indicated until the obstacle has been cleared; then build up more airspeed—somewhere between 70 to 80 mph—and at a safe altitude (50 feet or more above the terrain or obstacle) raise the flaps slowly.

Take-off performance of the 170-B varies directly with the amount of load aboard. With two 170-pound persons, full fuel load, and 100 pounds of baggage, performance is good. Take-off checks flown with this loading at Lost Nation airport (elevation 626 feet msl) on a day when the air temperature was 40-degrees F. with a six-knot wind, supported performance figures of 1,600-foot take-off distance required to clear a 50-foot obstacle. Likewise, performance was almost comparable when the 100 pounds of baggage was removed and a third 170-pound adult rode in the rear seat. However, when the airplane was loaded to a gross of 2,200 pounds—four 170-pound adults, 37 gallons of fuel, and 63 pounds of baggage—the combination of the 145 horses and the fixed pitch prop was not quite enough,

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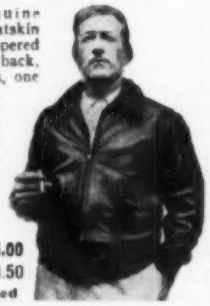

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in my opinion, to provide "no sweat" take-offs from some of the shorter turf runways around the nation. With the gross load aboard, and under the same weather and runway conditions as mentioned above at Lost Nation, the 170-B needed about 2,200 feet of distance to clear a 50-foot obstacle. The rate of climb was about 500 fpm, as compared to about 700 fpm with the first loading described.

Once airborne, though, the 170-B is a well-behaved airplane, especially with the lighter than gross loading. It trims up well, has good horizontal and longitudinal stability, visibility in flight is excellent. The airplane feels solid and is redlined at 160 mph. Cruising range for the Continental 145-hp engine is between 2,200 and 2,450 rpm. Cessna recommends 2,450 rpm as the setting which will supply the most practical cruise performance. This power setting (at lower altitudes) represents about 75 per cent power, and the 170-B will cruise 120 mph, burn about nine gph, and have a range (no wind, no reserve) of 500 miles. At 7,500 feet, with lean mixture, and a maximum range power setting of 2,100 rpm (about 39 per cent power), the 170-B will true out at 93 mph, burn about five gph, and have a maximum range (no wind, no reserve) of some 689 miles. Incidentally, Cessna advises that the Continental in the 170-B can be leaned at any cruising altitude. Also the mixture is leaned as required to obtain smooth engine operation when using carburetor heat in cruise.

Stalling speed with flaps up and the airplane loaded to gross weight occurs at 58 mph; with flaps down 40-degrees (full flap), it pays off at 52 mph. There is a slight elevator buffeting just before the stall with flaps down. The large, high-lift flaps can be operated at any speeds under 100 mph. In addition to their use for landing, they can be used to slow down the airplane while in flight. By reducing power to about 1,800 rpm, lowering flaps to the second position (20 degrees), and rolling in some trim, the Cessna 170-B will hold altitude while flying along at 80 mph in a fairly normal attitude.

Spot landings in the 170-B are a cinch with the effective flaps and docile landing characteristics. The glide is set up for 70 to 75 mph with flaps used as required. Over the end of the runway the airplane is slowed to 65 mph, and then flared out when several feet above the runway. The 170-B settles graciously three point through the ground cushion. Landing distance needed to land over a 50-foot obstacle at an approach speed of 70 mph varies between 1,100 to 1,200 feet at lower elevation fields (sea level to 1,000 feet) and at air temperature between 40 to 80 degrees F. About 40 per cent of the distance quoted is the ground roll.

In price range the 170-Bs varied between $7,245 and $8,900 depending again upon the year of manufacture. Today, depending upon the engine and airframe time, general condition, equipment installed, etc., the going prices vary from $4,500 to $5,500. If you are looking for a well-built, easy-to-fly airplane which offers good cross-country performance with a low operating cost, perhaps you should take a close look at the Cessna 170-B. END

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Air Space Muddle

(Continued from page 41)

have been lavishing billions for defense against a type of war less and less likely to be fought, from the DEW Line in the north to the radar nets and combat control centers across the continent.

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SAGE was made not to avoid collisions but to cause them—that is, interceptions—by all the magic the big electronics companies could devise. Compared with the pinpoint calculations for making hits, the planning of misses should be easy.

But SAGE is little more than a toy for the Generals to play at tactics that may avail, some experts think, about as much as those of the late General Custer.

The recent halt on a "hardened" underground nest for air defense indicates that this is beginning to look improbable, even in the Pentagon.

POSITIVE CONTROL

FAA thinks jet speed may require "positive control" at high altitudes. This is being tried above 24,000 feet in the Chicago area.

In the future, there may be three layers of traffic: high, where the jets whiz, under tight controls; medium, for slower transport and business planes; and low, for smaller private planes with relative freedom.

SAGE can be a working tool for positive control. Also, it can help release much airspace held for military use. Airliners are dog-legging around restricted areas that are little more than deer-hunting preserves.

With positive control, traffic can be blocked from such areas when necessary and fly at other times.

As FAA plans to train a corps of uniformed control tower operators for 300 military locations throughout the world, acquisition of SAGE is another logical step in military and civilian traffic integration.

This will not solve the whole air traffic problem and may add to the confusion for a time. But $5 billion worth of electronic brains, in the very area where congestion is worst, should greatly reduce hazards.

If the decision is not immediate, officials may soon face the blame for deaths they could have prevented. END

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Feb. 27—Antique Airplane Association first annual dinner dance at the Hotel Edison, New York City.

March 1-11, 1960—Third annual Flight to Mexico sponsored by Florida Aero Club. Starting vicinity of San Antonio (probably dude Ranch), Monterrey, Guadalajara, Mexico City, Acapulco, return to Brownsville, Tex. Contact: Harry B. Collins, Air Cruise Director, 375 N.E. 154th St., North Miami Beach 62, Fla.

March 24-26—Fourth National Conference on Aviation Education at the Brown Palace Hotel, Denver, Col. Conference Comm. Ch., Dr. William Hinkley, Supt. of Schools, Aurora, Col.

May 1-4—Annual meetings and news conferences, Aviation Writers Association, Ambassador Hotel, Los Angeles, Calif.

May 11-14—Sixteenth National Forum of the American Helicopter Society at Sheraton Park Hotel, Washington, D. C.

June 4-19—World Soaring Championship Contest, Butzweiler Aerodrome, Cologne, Germany. Sponsored by the German Aero Club. For information, write: Soaring Society of America, Box 66071, Los Angeles, Calif.

June 14-16—Aviation Distributors and Manufacturers Assoc. 35th meeting at Queen Elizabeth Hotel, Montreal, Canada.

July 11-21—Flying Physicians jet cruise to Hawaii via 707 from Los Angeles and San Francisco.

Sept. 12-17—Second International Congress of the Aeronautical Sciences at Zurich, Switzerland.

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I Learned About Flying

(Continued from page 70)

time. Plenty to finish the cross-country, I mused, heading for the glittering lights. Maybe I'd better check in with Alice control again and advise them of my situation. However, I rejected this idea, thinking I'd be over La Grange in a couple of minutes and could then give a correct position report. Anyway, I had already jammed the radio net enough and was sure my classmates, who were also flying that night, were having a laughing good time because Lieutenant McArthur was lost.

As the first of the city lights passed below me, I again made my position report to Alice control. Again the control ship did not recognize me. I kept circling the city, flashing my landing lights, sure I was over the correct city this time. But still no recognition from Alice. Suddenly another pilot broke into the conversation between Alice control and me.

"Alice control, this Blue 16. I think I can see Blue 21 circling a town south of your location. Request permission to direct him to La Grange. Over."

"Blue 16, this is Alice control. Affirmative. Somebody had better find him. Over."

"Blue 21, this is Blue 16. Do you read me? Over."

"This is Blue 21. Aha-roga-over."

"This is Blue 16. I am approaching your position from the north with my landing lights on. Can you see me? Over."

Banking around to a heading where I could see the area to the north, I spied him. I'll bet that light looked better to me than the one Columbus saw October 12, 1492. It was Lieutenant Woodmansee. I could tell that high-pitched voice anywhere.

"Blue 16, this is Blue 21. I see ya, Woody. Which way is La Grange? Over." (Incorrect radio procedure I know but at that time I had a certain feeling of relief.)

"This is Blue 16. Follow me!"

I followed Woody until he was sure I could see and identify La Grange. Then he turned for home because he was running low on gas. As I neared La Grange I could see the rotating red light from Alice control. By this time they were taking no chances on losing me and insisted I follow them back to Camp Gary, our home field. I didn't object to this a bit, even though it meant using almost full throttle to keep up with the control ship.

The flight back to Camp Gary gave me time to ponder my mistakes of the evening. Never again would I rush with a flight plan and from that time on, I always would double check my figures. I learned also, that some fairly large farming communities can look awfully small at night with all lights out by 9:00 p.m. END

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I've Never Heard the Wind

(Continued from page 47)

Then I saw Paul Mantz's Nieuports. I touched the wood and the cloth and the wire that let my father look down on the men who fought in the mud of the earth. I never got that delicious excited feeling by touching a Cessna 140 or a Tri-Pacer or even an F-100.

The Air Force taught me how to fly modern airplanes in a modern, efficient manner; no covering the airspeed indicator here. I've flown T-Birds and 86s and C-123s and F-100s. The wind hasn't once gotten to my hair. It has to get through the canopy (CAUTION—Do not open above 50 Knots IAS), then through the helmet ("Gentlemen, a square inch of this fiberglas can take an 80-pound shock force"). An oxygen mask and a lowered visor complete my separation from possible contact with the wind.

That's the way it has to be now. You can't fight MIGs with an SE-5. But the spirit of the SE-5 doesn't have to disappear, does it? When I land my F-100 (chop the power when the main gear touches, lower the nose, pull the drag chute, apply brakes till you can feel the antiskid cycle), why can't I go to a little grass strip and fly a Fokker D-7 airframe with 150 modern horses in the nose? I'd pay a lot for the chance!

My F-100 will clip along at Mach One plus, but I don't feel the speed. At 40,000, the drab landscape creeps under the droptank as if I were in a strictly enforced 25-mile speed zone. The Fokker will do an indicated 110 mph, but it will do it at 500 feet and in the open air, for the fun of it. The landscape wouldn't lose its color to altitude, and the trees and bushes would blur with speed. My airspeed indicator wouldn't be a dial with a redline somewhere over Mach One, it would be the sound of the wind itself, telling me to drop the nose a little and get ready to hop on the rudders, for this plane *doesn't* land itself.

"Build a World War I airframe with a modern engine?" you ask. "You could get a four-place plane for the money!"

But I don't want a four-place plane! I want to fly! END

Faith

(Continued from page 52)

"Air Force Four Two Four. This is GCA. Turn left 90 degrees for radar identification."

We banked the plane 90 degrees to the left. We could still see nothing but fog.

"Air Force Four Two Four. GCA now has you in definite radar contact 25 miles east of this station. Now turn right 280 degrees and descend to 1,000 feet."

A thousand feet is not much altitude—especially over the Bering Sea. Despite the warmth inside the plane, I shivered.

We were now lined up with the runway, our nose pointed earthward at a sharp angle. We couldn't see Shemya, but the GCA operator assured us that it was there, below us. We were now less than ten miles from the end of the runway.

The traffic controller, who had lined up our plane with the runway, turned the job over to the final controller, who had the delicate responsibility of talking us safely down the runway, along a glidepath that we could not see.

Clearly and confidently, with no unnecessary words, the final controller began his work. He kept the pilot continually informed of his progress, his altitude, his rate of descent.

"Air Force Four Two Four. You're one degree to the right of the glidepath. Eight hundred feet altitude."

The correction was made.

"Okay now. You're back on the glidepath. You're making an excellent approach. Your altitude is now 600 feet. You're one mile from touchdown.

"You're making an excellent approach. You're doing fine. Three hundred feet and one-half mile from touchdown."

We were gliding down through a solid blanket of white at 150 mph.

"You're right on the glidepath. An eighth of a mile from touchdown. One hundred fifty feet."

Through all the fog around us, there was still no sign of a runway. In the next second or two, we would land safely—or crash!

Then there was the runway, looming out straight ahead of us. We were less than 100 feet above it when we broke out of the soup. Our wheels touched gently down to the strip. As we taxied toward operations, our pilot pressed the button of his microphone.

"Thanks, GCA."

"Roger. Good luck to you, Captain."

As we taxied down the runway, I could scarcely see the other side of the strip.

Later that night, stretched out in the back of the plane as we pushed on toward Tokyo, my restless thoughts returned again and again to this remarkable demonstration of man's faith in his fellow man. Our Captain had never seen the men on the ground who talked him down to the ground, and he probably never would. Yet he'd accepted everything they'd told him or asked him to do without question. If they had been a fraction wrong anywhere, it would have meant almost certain death for us all.

How so very often, I pondered, do we practice such human faith, unaware, really, of how close in our daily life we really are to divine faith, on which it is all really based.

Time and again, since then, in many situations on the ground and in the air, I have asked myself the question, "Just what is faith?"

You have faith in a human being, for instance, when you believe the cook in a strange restaurant won't put arsenic in your soup. You don't even think about it. You merely accept. It's a kind of courage, in a way. Or maybe we really believe only when we have found sufficient evidence. Naturally, the first steps toward this acceptance of faith consist of looking for the evidence. Samples of faith can do far more good than sales talk

about it.

Just this year, on an assignment from my office, I made an around-the-world flight. Leaving New York, we landed at Shannon, Ireland; London, Frankfurt, Rome, Athens, Karachi, New Delhi, Bangkok, Singapore, Perth, Melbourne, Sydney, the Fiji Islands, Hawaii and Los Angeles before returning home.

We changed crews—pilots, navigators, radio operators, flight engineers—in London, Karachi, Bangkok and Perth. How many countless others were there, though, that contributed to this smooth, safe journey—mechanics, ground radio men, control tower operators, even the GCA operators who talked us down in a snowstorm at London?

If my very life depended upon it—and it most certainly did from the day I left until the day I returned—I couldn't tell you the name of one of them. Yet, never once, during this 23,000-mile trip, was I worried, never once did I consciously think of whether all these unseen, unknown people, holding my destiny, my future in their very hands, were black or white, friendly or unfriendly, capitalist or communist, theist or atheist. I merely accepted them and all they did on faith, just as I accept the fact that the sun will set tonight in the west, that I will awake tomorrow.

I mentioned this thesis later to an airline pilot friend of mine, Capt. David Shannon, who flies the Pacific for Qantas, the Australian airline.

"You're right, you know," he replied, "but it doesn't only apply to a passenger. The whole of flying is based on mutual trust. As a pilot I start off by trusting the airplane itself. I must rely on the builders. Then I rely on the maintenance men, the men who fix and repair my radios, the ground men who fill my tanks with gas when I'm on the ground. I accept honor and integrity in others. To me that's faith."

I've talked to countless others, too. Every experienced pilot has told me, "Yes, I've come to grips with The Fact: There is a God Who watches and Who cares."

Ed Mack Miller, a United Air Lines pilot of Denver, Colo., sums it up this way:

"Of course there is human faith, over and beyond divine faith. Faith is the flyer, and the flyer is faith. Who can doubt there is a God Who watches both the sparrow's flight and mine. How else the slowly spinning spokes of the season wheel? How else the tireless roll of interlocking cogs of 'high' and 'low' across a weather map? How else the neat geometry and clock-wheel synchronization of the lambent stars?"

Faith is with us in every daily thing we do.

Accept that—and I do without question—then how can we think of our passage through this world as meaningless?

Consciously or unconsciously, this beacon of faith is our guiding star, a candle that no storm, made by nature or by man, can snuff out.

END

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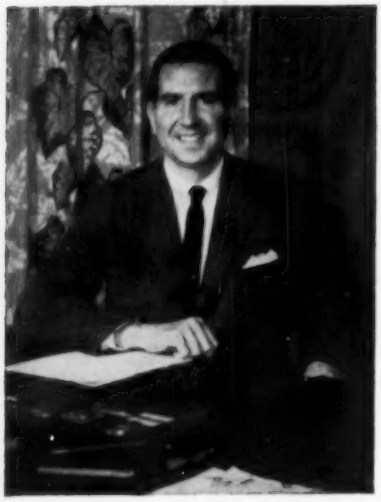

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Traffic Control

(Continued from page 35)

with RCA to develop this two-way high-speed data link known as AGACS. This tool will determine the parameters for exchange of essential routine flight information between aircraft and the controller. Non-routine communications will take place over the voice channels. Surveys reveal that routine flight information accounts for 90 per cent of present-day air traffic communication. In an AGACS area, all aircraft share a single channel, but only one aircraft is receiving or transmitting at any one time. However, the ground environment may challenge as many as 250 discreetly addressed aircraft per minute. AGACS will permit a direct automatic tie-in to the Data Processing Central and will make possible a much more accurate positioning of aircraft in space; and ultimately lead to reduction in separation criteria.

AGACS has been programmed for implementation in 1963-64. It first will be installed in the New York area. A working model will be delivered this fall.

Runway configuration and separation also plays an important part in the ability of an airport to accept traffic. FAA is continuing its experimentation with high-speed runway turnoffs to enable aircraft to clear the active runway at speeds of 60 knots. Experimentation is also being conducted to determine the feasibility of high-speed starting ramps.

A 3 D radar (AHSR-1) is also under development for air traffic control. The Air Height Surveillance Radar will provide height data on each aircraft in conjunction with azimuth and range data provided by conventional S-frequency band radar equipment.

On December 1, 1957, Civil Air Regulations were amended to establish the Continental Control Area as a first major step to improve high altitude traffic control service. On June 15, 1958, Special Regulation 424 authorized establishment of certain airways between 17,000 and 22,000 feet to be designated as positive control route segments.

Concurrently with inauguration of civil jet service in October 1958, a program of radar flight following and traffic advisory service was initiated, utilizing air defense and FAA long-range radar.

To increase the margin of safety during visual flight conditions in the vicinity of congested terminal areas, the FAA is expanding the radar traffic advisory service to the maximum extent possible. The advisory service is not intended to relieve a pilot of his responsibility for continual vigilance but is intended to call to his attention a specific direction in which a possible traffic conflict may exist.

Currently the FAA is developing a plan to implement a positive control concept on an area basis. This will initially encompass a range of altitudes from 24,000-35,000 feet and in a defined area of approximately 75,000 square miles. This concept will make maximum use of both primary and secondary radar to assist in separation. All aircraft will be in continuous communication with air traffic control; and radar identification will be

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maintained for all aircraft operating in this area. We expect to implement this program within the coming year and have tentatively selected the area under the surveillance of long range radars available in the Chicago and Indianapolis Air Route Traffic Centers.

We are looking towards eventual automation of the entire air traffic control system. The major features of this program are based on a common civil-military system of air traffic control that will include en route traffic control centers allocated and functionally integrated for purposes of economy and efficiency with the Air Force's Air Defense SAGE system. The second major element in the modernized system is the transitional/terminal traffic control facility. This will be a radar supported, highly sophisticated facility handling the great volumes of traffic surrounding the major hubs of air activity.

A typical intercity flight will involve, first, a controlled departure handled by the transition/terminal facility servicing the area in which the flight originates; second, control by an en route traffic control facility for the middle portion of the flight; and finally, a controlled approach at the destination handled by the transition/terminal facility serving that area.

It is the goal of the FAA to provide eventually for total control of all aircraft at the higher altitudes. The speeds of aircraft operating at the higher altitudes are such that, with a growing volume of such traffic, the long-used rule of "see-and-be-seen" will not provide an acceptable degree of safety.

At lower altitudes, the transitional terminal facilities will provide much greater traffic capacity in all weather conditions. In addition, transition/terminal facilities will handle the clear air situation on a more systematic basis and provide more radar advisory information to pilots flying under visual rules. END

Business with FAA

(Continued from page 39)

cross-country get in the habit of filing flight plans, even in fair weather when they are least needed. Pilots who form the habit will be sure to file in doubtful weather when it may be important for FAA to know where they are.

Let the nearest Air Traffic Communications Station know your position.

GET TALKED DOWN

When a pilot gets caught in weather, he may call the nearest tower for Ground Controlled Approach landing assistance, wherever the airport has GCA radar.

New pilot requirements include training in attitude control, for let-down under instrument conditions. Although not retroactive for those now holding private or commercial tickets, it is extra training that any pilot may wisely acquire.

CHECK FLIGHTS

FAA does not give check flights to maintain and increase pilot proficiency, but strongly recommends that all pilots get fairly frequent check rides with flight instructors or other pilots of su-

(Continued on page 110)

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(Continued from page 109)

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GOOD ADVICE

Experts in the FAA district offices are there to answer questions. For business flyers, the FAA men who have gone through special training at Oklahoma City are especially competent to help.

There is a course there, for example, in aircraft capabilities and limitations. What is the effect of temperature and altitude on landing characteristics?

FAA experts will urge you to read your aircraft manual, especially for multi-engine craft, to understand its performance. How do you crank down the gear by hand if the power fails? What is the minimum safe speed for single-engine performance?

FAA services, paid by your taxes, cost you nothing to use. The penalty for not using the common sense guidance FAA has for you may be very expensive indeed. Make the most of it. END

Ghosts in the Cockpit

(Continued from page 51)

sions are so compelling that pilots flying IFR will frequently prefer to accept the illusion rather than the contradictory—and correct—testimony of their instrument panel! It is for this reason that Warren devotes so much of his course time explaining and describing these illusions: half the battle of psychological air safety is awareness that there are sometimes *fewer* things in heaven and earth than pilots occasionally dream. Trust the instruments!

But for the private or businessman pilot who prefers VFR, the hazards of hallucination are equally great. "When outside visual references are eliminated," explains Warren, "the pilot who has not been trained to fly by instruments attempts to interpret his muscle sensations and 'inner ear' sense of balance in terms of attitude, particularly in reference to the angle of bank."

Cockpit hypnosis? It exists, opines Warren, who insists that the conditions of hypnosis are present in long periods of uneventful, straight and level flying.

But by far the greatest and most fatal error attributed to private pilots by the SC psychologist, is a pole-vault out of the area of illusions and perception into the tricky field of "judgment": taking off VFR in IFR weather. "There," says Warren, "is your greatest killer."

Other words of wisdom from Warren to the private flyer: Reduce autokinesis by not staring at lights. Avoid fascination (hypnosis) by shifting attention from one item to another. Avoid leaning over in the cockpit to pick up something when the aircraft is in a tight turn at night; this reduces chances of experiencing the "Coriolis effect"—leans of the same direction. Avoid violent maneuvers at night, or run the risk of vertigo. Above all, always remember that disorientation and hallucination may occur. When your private mirage contradicts the instruments, trust the instruments! END

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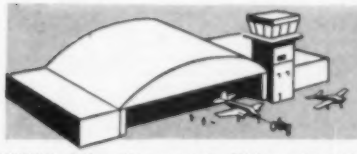

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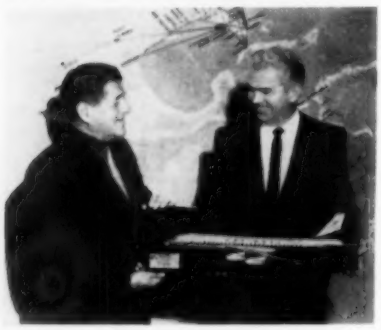
Briefings . . .

(Continued from page 14)

United Air Lines, Chicago, the informational material, arranged alphabetically in loose-leaf form, is taken from established authoritative government publications. Price, $7.50. Quarterly revisions, $20 per year. Address: 4880 N. Marine Dr., Suite 101, Chicago 40, Ill.

COMMEMORATING a quarter-century of leadership with National Airlines, G. T. Baker (left) president and board chairman, received a 25th anniversary plaque from Jackson R. McGowen, vice



president of Douglas Aircraft. The plaque, signed by the Donald Douglases, Senior and Junior, consists of a scaled half-section replica of a Douglas DC-8 jet, mounted on black onyx.

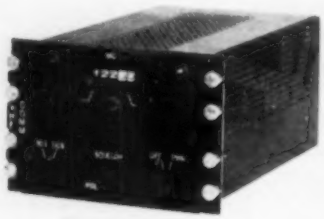
ESTABLISHED SOME six months ago to provide sales and service of leading electronic equipment, as well as new and used aircraft, Flight Electronics Corp., based at Westchester County Airport, White Plains, N. Y., is now franchised distributor and service station for Collins, Lear, Narco and Wilcox lines of electronic equipment and an approved Aircraft Radio Corp., and DARE service facility. Additionally, FEC is metropolitan area distributor for the Mooney Mark 20-A four-place, single-engine airplane. Principals of the company are three business aircraft owners—Benjamin B. Peck, president; Herman M. Cole, treasurer and Al E. Chaite, secretary. Sidney M. Nesbitt, active in aviation since 1928, is vice president and general manager.

L. B. SMITH at Miami (Fla.) International Airport is in receipt of an order from General Mills, Inc., of Minneapolis, Minn. for the number two production model of its recently introduced Tempo II, a high speed, pressurized redesigned Douglas B-26. Delivery is scheduled for early spring.

IN AN EFFORT to aid aircraft owners distantly located from aircraft service facilities and manufacturers, FAA in new Amendment 1-3, to Part 1 CAR, effective Dec. 8 last, now allows a certificated mechanic holding inspection authorization to inspect and certify airworthiness of single-engine, fixed-wing aircraft. Another section of this new regulation also provides that any aircraft, temporarily transferred to the experimental category, need not be inspected again before it is returned to its former use. The plane must still, however, be presented to FAA for an airworthiness certificate.

INDEFATIGABLE MAX CONRAD has added another non-stop distance record to his many other flying records. This time it is a non-stop distance record for Class 3 aircraft (between 2,204 and 3,858 pounds fully loaded) completed on Thanksgiving Day at El Paso, Tex., after leaving Casablanca, Morocco 56 hours and 26 minutes before. The old record for this class was set by the late Bill Odom from Honolulu to Teterboro, N. J., in 1949. Only last June, Conrad established a new non-stop record for Class 4 aircraft on a flight from Casablanca to Los Angeles in a 250-hp Piper Comanche. The same Comanche was used in this, his latest flight, but with a 180-hp Lycoming powering it.

COLLINS RADIO, Cedar Rapids, Iowa, recently announced this light weight 618F-1VHF Transceiver which provides 360 crystal-controlled air-to-ground communication channels for all single and twin-engine aircraft. Minimum output power conservatively rated at 6 watts, meets FCC and FAA TSO performance

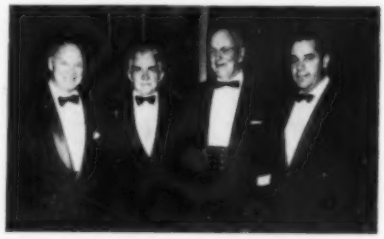


requirements. Transistorized, the 618F-1 operates off either a 27.5 or 13.75 v dc source; provides complete communications service from 118.0-135.95 mc with direct frequency presentation and single channel simplex or double channel simplex operation. List price $2,295.

FORMATION of a major new electronics company through consolidation of its four principal subsidiaries is reported by General Precision Equipment Corp. To be known as General Precision, Inc., the four divisions involved are General Precision Laboratory, Inc., Pleasantville, N. Y.; Kearfott, Inc., Little Falls, N. J.; Librascope, Inc., Glendale, Calif., and Link Aviation, Inc., Binghamton, N. Y.

UNIVERSITY OF MICHIGAN, owners of Willow Run Airport serving Detroit, plans to develop the airport into a center for business and personal aircraft, even if all commercial airline operations are transferred to Wayne County Airport nearer downtown Detroit. Willow Run, a Class 6 airport, located four miles east of Ypsilanti and 22 miles WSW of Detroit, is fully equipped; offers six paved runways, the shortest over 6,000 feet.

HIGHLIGHTING the Wings Club annual Fall banquet in New York's Biltmore Hotel, four of the aviation industry's most respected personalities received the National Aeronautic Association's honors



as "Elder Statesmen of Aviation." NAA's retiring president (extreme right) Thomas G. Lanphier, Jr. presented the awards to (l to r) FLYING's publisher, Gill Robb Wilson, Preston R. Bassett, former president of Sperry Gyroscope Co., Reuben H. Fleet, former president of Consolidated Aircraft—now Convair; and, in absentia, one-time head of U. S. Navy Bureau of Aeronautics, Walter Diehl.

OWNERS AND PILOTS of corporate and private aircraft may now use the American Express credit card to charge services, maintenance, instruction, charter and accommodations at some 177 fixed base operations at airports in 45 states and Canada. A 12-page leaflet listing operators and services available on credit card presentation, by state and city, may be obtained from American Express, Sales Div., Box 37, Church St. Station, New York 8, N. Y.

EVERYTHING NEEDED for lubrication of your aircraft and engine, this new lubrication kit contains two high pressure, pistol-type oil dispensers of unbreakable plastic, each of which develops up to 3,090

psi pressure; provides a drop of oil at a time or a fine stream. Both load easily, give one-hand operation and indicate visual supply. A product of Cold Spring Products Co., Cold Springs, N. Y. Price: $3.75 ppd.

FOR OUTSTANDING contributions made to safe flying" through its advertising program, Esso Standard Oil Co., has been awarded the Flight Safety Foundation's Merit Award for 1959. The award cites Esso specifically for its series of "Wing Tips" advertisements aimed at private and business pilots, each of which presented, in color, three or four quick and practical reminders for safer, easier and better flying.

PRINTED IN U.S.A.

WING TIPS

DON'T BE DECEIVED. Being surrounded by mountains produces illusions which could be dangerous. One is using a distant mountain for a horizon. The danger is that you're likely to keep pulling up the nose till you stall. Be safe – check air speed and altimeter regularly in this situation.

BE A "MUDWATCHER". Sudden downpours are likely to create hazardous taxiing situations for the pilot. Innocent-looking puddles may cover a virtual quagmire which will nose over many a light plane or even a twin engine ship. So when taxiing – be wary – be wise – beware – of mud!

BEWARE OF "T" CLOUDS. Big Chief Thunderhead will have your scalp if you unwittingly cross his path. Violent updrafts and downdrafts, skin-tearing hailstones and the usual lightning and rain may be your downfall if you decide to risk it. Even the overhang is treacherous, never fly near it. Either go around or beat a safe path home.

DEALER SERVICE. From Maine to Louisiana – you'll find many Esso Dealer Airports conveniently located to provide high quality Esso products – the first preference of experienced pilots. Esso Aviation Credit Cards, Esso Flight Plan Sequence Cards and Flight Calculators are some of the many service aids which Esso Aviation Dealers provide to pilots.

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	BENDIX RDR-1D SYSTEM	OTHER X-BAND MAKE
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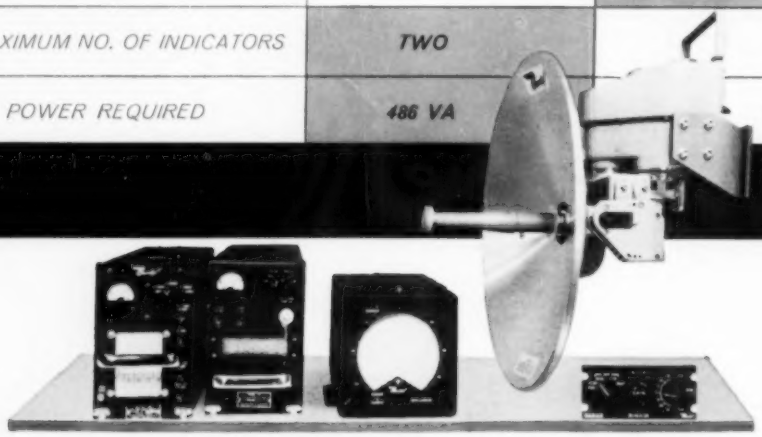
SCAN ANGLE	**120°**	80°
ANTENNA TILT	**± 15°**	± 10°
WEIGHT	82 LBS	**50 TO 57 LBS**
MAXIMUM NO. OF INDICATORS	**TWO**	ONE
AC POWER REQUIRED	**486 VA**	515 VA



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For more details on the Bendix RDR-1D, the weather radar system *with experience*, write:

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